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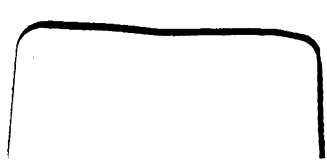

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54, HATTON GARDEN, LONDON, E.C.;

SOLD AT THE SOCIETY'S ROOMS, 11, CHANDOS STREET,
CAVENDISH SQUARE,
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IN THE TRANSACTIONS FOR 1880.

Page 133, line 5 (from top), for "Salvini's" read "Salvin's."
„ 136, line 2 (from bottom), for "*Keewaydim*" read "*Keewaydin*."
„ 139, line 9 (from top), the word "nastes" should be in Italics.
„ 140, line 14 (from top), for "*Keewaydon*" read "*Keewaydin*."
„ 140, line 20 (from bottom), for "food plant" read "food plants."
„ 140, line 14 (from bottom), for "are not" read "is not."
„ 140, line 5 (from bottom), for "McLachan" read "McLachlan."
„ 140, line 2 (from bottom), for "germ" read "genus."
„ 141, line 17 from top), for "Pauens" read "*Pallens*."
„ 257 (lines 3 and 7 from top) and p. 261 (lines 4 and 5 from bottom) for "mesopleuræ" read "mesopleura."

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Page vii, line 12 (from bottom), for "was observed" read "was not observed."
Pages ix (line 1 from top) and xi (line 6 from top), for "1878" read "1880."

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1870 Porritt, George T., F.L.S., *Huddersfield.*
1874 S. Power, Hy. d'Arcy, F.L.S., 3 *Cottage-green, Camberwell*, S.E.
1851 Preston, Rev. Thomas Arthur, M.A., F.L.S., *The Green, Marlborough, Wilts.*
1876 Preudhomme de Borre, Alfred (Sec., Ent. Soc. of Belgium), 19 *Rue de Dublin, Ixelles, near Brussels.*
1878 Price, David, 48 *West-street, Horsham, Sussex.*
1867 S. Pryer, H. J. S., *Yokohama, Japan.*
1870 Puls, J. C., *Place de la Calandre, Ghent.*

1872 S. Ranson, Wm. Hy., M.D., F.R.S., *The Pavement, Nottingham.*
1874 Reed, Edwyn C., F.L.S.
1865 Reeks, Henry, F.L.S., *Manor House, Thruxton, near Andover, Hants.*
1871 Riley, C. V., State Entomologist, *United States Entomological Commission, Washington.*
1853 Ripon, George Frederick Samuel Robinson, Marquis of, K.G., F.R.S., F.L.S., 1 *Carlton-gardens*, S.W.
1880 Robinson, Frank Edward, 10 *Little Clarendon-street, Oxford.*
1869 Robinson-Douglas, William Douglas, F.L.S., F.R.G.S., *Orchardton, Castle Douglas*, N.B.
1872 S. Rothera, G. B., *High-street Place, Nottingham.*
1868 Rothney, G. A. J., *Calcutta.*
1876 † Rutherford, David Greig, F.L.S., F.R.G.S., F.Z.S., &c.
1876 † Rye, Edward Caldwell, F.Z.S., *Parkfield, Putney*, S.W.
1865 Rylands, Thomas Glazebrook, F.L.S., F.G.S., *Highfields, Thelwall, Warrington.*

1875 Sallé, Auguste, 13 *Rue Guy de la Brosse, Paris.*
1866 † Salvin, Osbert, M.A., F.R.S., F.L.S., &c., 10 *Chandos-street, Cavendish-sq.*, W.; and *Brookland-avenue, Cambridge.*
1865 † Saunders, Edward, F.L.S., Treasurer, *Holmesdale, Wandle-road, Upper Tooting*, S.W.
1861 † Saunders, G. S., *St. Stephens, Canterbury, Kent.*
* Saunders, Sir Sidney Smith, C.M.G., *Gatestone, Central Hill, Upper Norwood*, S.E.
1865 Schaufuss, L. W., Ph.D., M.Imp.L.C.Acad., &c., *Dresden.*
1880 Scott, Sir Arthur, Bart., 97 *Eaton-square*, W.; and *Great Barr Hall, Birmingham.*
1875 † Sealy, Alfred Forbes, *Cochin, South India.*

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1864 Semper, George, *Altona.*
1862 Sharp, David, M.B., *Eccles, Thornhill, Dumfriesshire.*
1847 Shepherd, Edwin.
1852 Sheppard, Edward, F.L.S., 18 *Durham Villas, Kensington,* W.
1867 Sidebotham, Joseph, *The Beeches, Bowdon, Cheshire.*
1877 Slater, John Wm., 18 *Wray-crescent, Tollington Park,* N.
1880 Smith, Miss Emily A. (Assist. State Entomologist of Illinois), *Peoria, Illinois;* and *Care of Dr. R. Leuckart, Leipzig.*
1869 Smith, Henley Grose, *Warnford-court, Throgmorton-st.,* E.C.
* † Spence, William Blundell, *Rome.*
1848 † Stainton, Henry Tibbats, F.R.S., F.L.S., &c., *Mountsfield, Lewisham,* S.E.
1878 Standen, Richard S., *The White House, Alby, Norwich.*
1862 Stevens, John S., 38 *King-street, Covent Garden,* W.C.
1837 Stevens, Samuel, F.L.S., *Loanda, Beulah Hill, Upper Norwood,* S.E.
1876 Swinton, A. H., *Binfield House, Waterden-road, Guildford.*

1854 S. Thompson, Miss Sophia, *Barn Hill, Stamford.*
1856 Thomson, Jas., 12 *Rue de Presbourg, Place de l'Etoile, Paris.*
1859 † Trimen, Roland, F.L.S. (Curator of South African Museum), *Cape Town, Cape of Good Hope.*

1869 Vaughan, Howard, 11 *Ospringe-road, Brecknock-road,* N.W.
1849 Vaughan, P. H., *Redland, Bristol.*
1866 Verrall, G. H., *Sussex Lodge, Newmarket.*

1876 Wakefield, Charles Marcus, F.L.S., *Belmont, Uxbridge.*
1879 Walhouse, Moreton J., F.R.A.S. Beng., 9 *Randolph-crescent, Maida Vale,* W.
1870 Walker, Rev. Francis Augustus, M.A., F.L.S., *Bourne Villa, Bournemouth, Hants.*
1878 S. Walker, J. J., R.N., 12 *Ranelagh-rd., Marine Town, Sheerness.*
1858 Wallace, Alexander, M.D., *Trinity House, Colchester.*
1868 † Wallace, Alfred Russel, F.L.S., F.Z.S., &c., *Pen-y-bryn, St. Peter's-road, Croydon.*
1866 Walsingham, Thomas de Grey, Lord, M.A., F.Z.S., &c., *Eaton House, Eaton-square,* S.W.
1866 Ward, Christopher, F.L.S., *Savile-road, Halifax.*
1875 Ward, Frederick Henry, *Springfield, Tooting,* S.W.
1869 Waterhouse, Charles O., *British Museum,* W.C.
* Waterhouse, George R., F.Z.S., &c., *British Museum,* W.C.
1869 Websdale, C. G., 78 *High-street, Barnstaple.*
1845 Weir, John Jenner, F.L.S., 6 *Haddo Villas, Blackheath,* S.E.
1876 Western, Edward Young, 27 *Craven Hill Gardens, Bayswater,* W.
* Westwood, John Obadiah, M.A., F.L.S., &c., Hope Professor of Zoology, *Walton Manor, Oxford.*
1868 † White, F. Buchanan, M.D., F.L.S., *Perth,* N.B.
1865 White, Rev. W. Farren, *Stonehouse Vicarage, Gloucestershire.*
1874 Wilson, Owen, *Cwmffrwd, Carmarthen.*
1878 Woodgate, John, *Richmond-road, New Barnet, Herts.*
1874 Wood-Mason, James, F.G.S., F.L.S. (Curator of the Indian Museum), *Calcutta.*
1862 Wormald, Percy C., 2 *Clifton Villas, Highgate Hill,* N.

1865 S. Young, Morris, *Free Museum, Paisley.*

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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON

FOR

1880.

February 4, 1880.

J. W. Dunning, M.A., F.L.S., Vice-President, in the chair.

The Secretary, on behalf of the President, nominated Mr. H. W. Bates, Mr. J. W. Dunning, and Mr. H. T. Stainton, Vice-Presidents for 1880.

The minutes of the two previous meetings were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of a Member and Subscribers.

Mr. Patrick F. Copland, of Hillcote, Buckhurst Hill, Essex, was ballotted for and elected a Member.

Mr. John B. Bridgman, of 69, St. Giles Street, Norwich, and Mr. Peter Cowell, Librarian of the Free Public Library, William Brown Street, Liverpool, were ballotted for and elected Subscribers.

Exhibitions, &c.

Mr. H. T. Stainton exhibited, on behalf of Mr. Grigg, of Bristol, a specimen of *Heliothis scutosa*, captured near Weston-super-Mare.

Mr. F. P. Pascoe exhibited a specimen of the common "fire-fly" of the Amazon Valley (*Aspisoma lineatum*), a species not mentioned by Messrs. Bates and Wallace. It has the usual intermittent light, flashing at intervals of about two seconds; but Mr. Pascoe believed, contrary to the general opinion, that the insect was capable of keeping back the light for an indefinite time, as he found that when alarmed they at once disappeared. Mr. Pascoe remarked that it would be very desirable that entomologists abroad should pay some attention to these "fire-flies"; they seem to vary in different localities. Mr. M'Lachlan had just told him that he had been informed when in Sydney that in the country to the north the "fire-fly" was a Dipterous insect.

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The Rev. H. S. Gorham stated that the term "fire-fly" was applied to all luminous insects indiscriminately. In the district where Mr. Pascoe's specimen occurred there were perhaps fifty species of highly phosphorescent Coleoptera. With regard to our species, *Lampyris noctiluca*, he did not think that the insect had the power of *suddenly* withdrawing its light, having often handled and irritated them with a view to trying the experiment. He was of opinion that the light of the female *L. noctiluca* is certainly brighter when the insect is unimpregnated; after which it ceases to be so brilliant. Mr. Gorham believed that the so-called "flashing" was often simply due to the creature crawling over leaves and herbage, and thus exposing the ventral surface only at times.

Mr. M'Lachlan remarked that the subject of the simultaneous flashing of fire-flies had been brought under the notice of the Society in 1865 by the Rev. Hamlet Clark (see Proc. Ent. Soc., ser. iii., vol. ii., pp. 94, 101), and that he had at that time advanced the opinion that the phenomenon in question might be caused by currents of air inducing the insects to simultaneously change their direction of flight. He was of opinion that the common glow-worm was not capable of extinguishing its light when alarmed, as he had captured large numbers in a net at the same time, the insects nevertheless continuing to shine.

Mr. Osbert Salvin stated that in the Central American region he had observed that a luminous Elaterid, *Pyrophorus*, had a *straight* flight.

Sir Sidney Saunders stated that in the South of Europe (Corfu and Albania) the simultaneous flashing of *Luciola italica*, with intervals of complete darkness for some seconds, was constantly witnessed in the calm summer nights, when swarming myriads were to be seen far and near obeying this peculiar instinct of their race. He did not concur in the hypothesis propounded by Mr. M'Lachlan, that currents of air might induce a number of these insects simultaneously to change the direction of their flight, and thereby occasion a momentary concealment of their light, which would seem to imply a continuous luminosity, casually occulted; whereas the flashes are certainly intermittent, as shown by the difficulty experienced in capturing a specimen flying in the open close at hand, when the flash becomes extinguished before the object can be attained, to be renewed for an instant at the distance of several feet. The simultaneous character of these corruscations, among vast swarms, would seem to depend upon an intuitive impulse to emit their light at certain intervals as a protective influence, which intervals became assimilated to each other by imitative emulation. But whatever the inciting causes of the phenomenon, he affirmed that the fact itself was incontestable, and a frequent subject of remark by all observers there.

Mr. Jenner Weir said that he had noticed that when a glow-worm was captured the light began gradually to diminish in intensity, but did not quite cease to be visible.

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Mr. Meldola remarked that when in Ceylon, in 1875, he had captured numerous specimens of a Lampyrid (*Luciola vespertina*, Fab. = *Calophotia perplexa*, Walker), which was swarming everywhere over bushes and tall grass. The flight of the species was *straight*, and the insects did not fly in gregarious swarms. When captured and put in a box it gradually diminished the intensity of its light in the manner described by Mr. Weir, but if left undisturbed was soon glowing with full brilliancy. Mr. Meldola observed, in conclusion, that the exact nature of the phosphorescence was still an unsolved problem, interesting both to the physicist and biologist. Some years ago he had examined the spectrum of the glow-worm, and found that it was continuous, being rich in blue and green rays and comparatively poor in red and yellow.

Mr. Pascoe also exhibited the two sexes of *Isopogon hottentottus*, a Dipterous insect, which he was informed by Mr. R. W. Meade, of Bradford, had been hitherto unrecorded in this country. Above a dozen individuals were gamboling in the air in a confined space among some yew trees at Box Hill, occasionally settling on the leaves. When he had taken four or five specimens the remainder, probably alarmed, disappeared. He remarked that the members of the family to which this fly belongs (*Asilidæ*) are generally solitary in their habits, alighting on the ground in some pathway or open spot, then darting off a short distance. They are perhaps the most daring and ferocious of all insects; they have even been known to pounce upon and carry off a tiger-beetle (*Cicindela*), although one was quite as large as the other.

The Secretary exhibited, on behalf of Mr. George Francis, of Adelaide, specimens of a South Australian moth (*Anapæa*, sp.?), which feeds on the native *Eucalypti*. The species was the same as that exhibited last year. (See Proc. Ent. Soc. 1879, p. xv). The series comprised also the larvæ in different stages of growth and living cocoons. Mr. Francis likewise forwarded a specimen, in alcohol, of a venomous spider (*Latrodectus* sp.?), and several galls and microscopic objects.

The Secretary also announced that he had received a letter from Mr. A. H. Swinton, calling in question the specific distinctness of *Acronycta Psi* and *A. Tridens*, with reference to Mr. Butler's recent communication on this genus (Trans. Ent. Soc. 1879, p. 313). Mr. Swinton had failed to detect any well-marked differences between the larvæ of these two species.

Mr. Meldola read the following note:—

"*On the Protective Attitude of the Caterpillar of the Lobster Moth.*"

"Most entomologists have admitted that the grotesque attitude of those caterpillars forming Newman's 'Cuspidate' group was in some way protective, but it is only quite recently that Dr. Hermann Müller has

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made known* the results of his observations on the caterpillar of *Stauropus Fagi*, which observations now for the first time tend to show the true meaning of this attitude in the species in question. When sitting on a twig in its natural position the head and first five segments are held erect, and the greatly lengthened legs of the second and third segments held outstretched; thus, when seen from the front, the whole aspect of the insect, both in form and colour, is most spider-like, and when alarmed it immediately raises its four long legs and moves them irregularly, after the manner of a spider attacking its victim. This spider-like appearance is believed to be a special protection against ichneumons which may approach it from the front. According to the experience of H. Müller ichneumons are especially afraid of spiders, and he states, on the authority of Fleddermann, an experienced breeder of insects, that the larva of *S. Fagi* was never found to be attacked by ichneumons, whilst, according to Treitschke, the nearly allied *Hybocampa Milhauseri* is often attacked by them, although a much rarer species, which rarity may perhaps be attributable to the complete absence of such protection as that possessed by *S. Fagi*.

"So much for the front aspect of the caterpillar under consideration. When approached from the rear there is nothing to be seen but the erect, hard, shield-like surface of the last segment surmounted by two black horns, and presenting an appearance totally unlike that of a caterpillar. When a side-view of the larva is presented there is seen on the fourth and fifth segments a small black depression just below the spiracles, and giving the appearance of a caterpillar *which has been stung by an ichneumon*, so that one of these foes approaching from the side would be deceived and abandon it without depositing its eggs."

Mr. S. Stevens stated that, having recently reared several specimens of *S. Fagi*, he could confirm the opinion of Dr. H. Müller as to the spider-like appearance of the larva.

Papers read.

The Rev. H. S. Gorham communicated a continuation of his "Materials for a Revision of the *Lampyridæ*," the present paper treating of the genus *Photinus*.

Dr. Sharp communicated a paper entitled "On some Coleoptera from the Hawaiian Islands."

New Part of 'Transactions.'

Parts III. and IV. of the 'Transactions' for 1879 were on the table, and also copies of the Address given at the last Meeting.

* 'Kosmos,' Nov. 1879, p. 123.

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March 3, 1880.

H. T. Stainton, F.R.S., &c., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Members.

Dr. Henry Charles Lang, of 41, Berners Street, Oxford Street, and Mr. Frank Crosbie, of The Chestnuts, Barnet, Herts, were ballotted for and elected Ordinary Members.

Exhibitions.

Mr. F. P. Pascoe exhibited several species of scorpions *à propos* of a controversy which has recently been going on in 'Nature,' respecting a statement that scorpions are in the habit of stinging themselves to death when in the midst of a circle of fire from which they are unable to escape. He pointed out that the two common European species, *Scorpio europæus* and *Buthus occitanus*, were almost physically incapable of reaching a vital part owing to the shortness of the tail or post-abdomen. Mr. Pascoe thought there must be some error of observation with those who asserted the contrary. From his own experience, he believed that scorpions were only able to strike backwards and a little upwards. In some forms with very long tails, such as *Lychas*, &c., it might be quite possible for the animal to insert its "sting" into the soft parts between the segments; but he thought it was questionable whether, in this mild way, any poisonous matter would be ejected. Another difficulty was that when the tail was so bent back the convexity of the sting would be downwards, and consequently its point would be upwards and away from the cephalothorax.

Mr. S. Stevens exhibited, on behalf of Mr. Pim (who was present as a visitor), a dwarfed female specimen of *Plebeius Icarus* (*Lycæna Alexis*).

The Rev. A. E. Eaton exhibited three plates of drawings of *Ephemeridæ*, showing the structural details of the species represented. These beautifully executed plates, which are about to be published in a forthcoming work on this family, contained figures of the following species:—

Tricorythus maximus (in *Cænis*), Joly.

Bætisca obesa, Say. The fore-wings of this species are connate along the greater part of the terminal margin, so as to form a shield covering the base of the abdomen. Antennæ short, deflected, 7-jointed, with the joints unusually long. Labial palpi 3-jointed, chelate.

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The third species was a Chilian form of undetermined genus, remarkable for the possession of symmetrical mouth-organs. Maxillary palpi 11-jointed. Labial palpi 14-jointed.

Mr. M'Lachlan remarked that these drawings were some of the most beautiful and detailed that had ever been executed for any family of insects. The observation as to the connate nature of the wings in the nymphs of *Bætisca* was of great value, as explaining the true nature of the carapace-like thorax of that insect.

The Secretary exhibited, on behalf of Mr. George Francis, of Adelaide, the microscopical specimens referred to at the last meeting, which had been kindly mounted for exhibition by Mr. William Cole. The series comprised a number of eggs of a *Chrysopa* suspended in the usual manner by long silken threads from the edge of a *Eucalyptus*-leaf, and the beautiful shell-like scales formed by a *Coccus*, together with the insects found beneath the scales.

Mr. Howard Vaughan exhibited a series of *Cidaria russata* from Yorkshire and the Isle of Arran, showing the local variation of this species.

Papers read, &c.

The Rev. H. S. Gorham read a paper on the *Lampyridæ*, in continuation of those communicated at the meetings of December, 1879, and February, 1880, the present instalment concluding the revision of the genus *Photinus*.

Mr. Gorham also read a paper summing up the results of his observations on the *Lampyridæ*, with respect to their phosphorescence, which he believed to serve the part of a beacon for attracting the sexes to one another. In support of this conclusion he stated that he had found that the eyes of these species were developed in magnitude according to the amount of luminosity displayed. With regard to the typical species of the family, he had observed that in the most highly organized genera, such as *Lamprocera* and *Cladodes*, the light-emitting faculty did not appear to be developed in proportion with the rest of the organs, and that the eyes were also reduced "in a direct ratio with the light," being small and uniform in both sexes, whilst the antennæ were "developed in inverse ratio as the phosphorescence is diminished." In illustration of this supposed correlation between the development of the antennæ and the intensity of the light, Mr. Gorham exhibited a selection of species arranged in three groups, *viz.*:—

(1). Species with plumose antennæ, small eyes, and light-emitting surface confined to small spots only. (*Lamprocera*, *Cladodes*, *Vesta*, *Phænolis*, and *Megalopthalmus*.)

(2). Species with simple antennæ, eyes large, sometimes excessive, both sexes winged; phosphorescence considerable, sometimes greater in the female. (*Cratomorphus*, *Lucernula*, *Aspidosoma*, *Luciola*, and *Photuris*.)

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(3). Species with female apterous or with rudimentary wings; phosphorescence often very great in female, and frequently rudimentary in male; antennæ generally rudimentary; eyes large in the male, often occupying nearly the whole head. (*Pleotomus, Microphotus, Lampyris,* &c.)

Mr. Stainton asked how Mr. Gorham had determined the intensity of the light emitted by the insects which had been grouped in the manner above referred to, since it appeared extremely difficult to say with certainty whether one insect was more luminous than another without some actual photometric measurement made upon the species when alive.

Mr. Gorham stated in reply that the light-emitting segments at the extremity of the abdomen were distinguishable by their white vitreous appearance, and that he had considered the number and size of such segments to indicate the phosphorescent power. He did not consider that these vitreous segments were themselves luminous, but that the source of light was within the body of the insect, and shone through the transparent segments or could be withdrawn at pleasure. In this manner he thought the gradual extinction or intermittent flashing of the light might be explained.

Mr. Pascoe remarked that it was much to be regretted that Mr. Gorham had not been able to observe the phosphorescence of some of the exotic *Lampyridæ* in their native habitats, as he had no doubt that many of the opinions now advanced would thus have to be considerably modified.

Mr. W. C. Boyd asked how, on Mr. Gorham's view, the supposed source of light could be withdrawn from the transparent segments, since the size of the insects' bodies did not leave much space for such withdrawal?

Mr. C. O. Waterhouse suggested that the light-source might be withdrawn into that portion of the body having opaque segments.

Mr. M'Lachlan, in connection with his idea of the supposed contemporaneous flashing of all the individuals in a swarm of *Lampyridæ*, called attention to flies of the genus *Argyra*, which when flying exhibited at times an appearance similar to that of small snow-flakes, owing to the silvery pubescence with which part of the body was clothed, but which was observed in certain positions, and especially when the insects rested, owing to the pubescence being then concealed; he thought this to some extent was an analogous case to that of the light of swarms of *Lampyridæ*.

Sir Sidney Saunders observed that the discussion involved two distinct questions,—namely, the flashing at intervals and the simultaneous action of large numbers in displaying their luminosity,—both of which he considered as indisputable facts. As regards the first, he mentioned the circumstance that when flying past, free from all obstructions, the *Luciola* suddenly emits its light, and then remains untraceable until it repeats its flash at a distance of some yards, and is therefore difficult to capture unless by overtaking the fugitives and sweeping with a hat in the observed direction.

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They then exhibit a casual glare as they crawl about within. As to the contemporaneous flashes of myriads, such as are more frequently congregated on the calmest nights, surrounding objects previously involved in obscurity become suddenly illuminated as if by electricity, and as rapidly plunged in their antecedent gloom at alternate intervals. He could not concur in the hypothesis that currents of air had any connexion with such displays or occultations, when not a breath was stirring around; nor that these manifestations might be evoked by sexual influences, amid vast hosts instigated to combine therein and act in unison. He would rather attribute this phenomenon to an inherent tendency to emit their light from time to time, requiring a certain period of repose to recruit their powers; and when any thus surcharged felt intuitively inspired to take the initiative, the others—prompted to obey a corresponding impulse—followed such example in responsive sequence. He confirmed Mr. Gorham's remarks as to the luminous segments of the abdomen being diaphanous and recognizable, adding that their luminosity was retractile and of a quivering character, with alternations of a golden lustre, differing from the phases exhibited when disporting in mid-air.

The Rev. A. E. Eaton remarked that while the subject of insect luminosity was under discussion, it might be interesting to mention that Dr. Hagen, in a paper published in the 'Transactions' of the Society for 1873 (p. 399), had stated that a species of *Ephemeridæ* (*Cœnis dimidiata*) had been sent to him by Prof. Zaddach as a luminous insect, two males having been captured at night near Pillau "giving a small blue light."

Mr. Meldola stated that Mr. Thomas Belt, in his well-known 'Naturalist in Nicaragua' (p. 320), had expressed his belief that the luminosity of the *Lampyridæ* played the same part as the bright colours of many caterpillars, *i. e.*, that it served as a danger signal, warning nocturnal foes of the inedibility of the species of this family, which he had found to be generally distasteful to birds, &c. Their immunity from persecution is also testified by the fact that the species of this family are very frequently mimicked by other beetles, and even by insects of other orders.

Mr. C. M. Wakefield communicated a paper by Mr. R. W. Fereday, entitled "Description of a new Species of the Family *Leucanidæ* and a new Species of the Genus *Chlenias*."

Mr. A. G. Butler communicated a paper "On Synonyms of Heterocerous Lepidoptera."

Mr. C. O. Waterhouse communicated "Descriptions of *Cetoniidæ* and *Cerambycidæ* from Madagascar."

New Part of 'Transactions.'

Part V. of the 'Transactions' for 1879, containing index, title-page, &c., was on the table.

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April 7, 1878.

H. T. Stainton, F.R.S., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Members.

The following gentlemen were ballotted for and elected Ordinary Members:—George Carter Bignell, 7, Clarence Place, Stonehouse, Plymouth; W. D. Cansdale, 4, Guithavon Terrace, Witham, Essex; Frank Crisp, LL.B., B.A., Sec.R.M.S., 5, Lansdowne Road, Notting Hill, W.; and the Rev. W. Fowler, M.A., F.L.S., Repton, Burton-on-Trent. M. Ed. Andrè, 21, Boulevard Brétonnière, Beaune (Côte d'Or), France, was ballotted for and elected a Foreign Member.

Exhibitions, &c.

Mr. John T. Carrington exhibited a pale variety of *Arctia caja*, bred by a gentleman at Croydon, who had been experimenting upon the effects of the rays of light transmitted through glasses of various colours upon the species. The variety exhibited had been reared under green glass, but there was no evidence to show that the variation was due to the green rays.

The Secretary read the following communication from Mr. G. A. J. Rothney, of Calcutta:—

"*On Insects destroyed by Flowers.*

"I notice in the report of your proceedings for April 2nd, 1879, a letter from Mr. J. W. Slater, from which I copy the following extract:—'Whilst it is generally admitted that the gay coloration of flowers is mainly subservient to the purpose of attracting bees and other winged insects, whose visits play so important a part in the process of fertilization, it seems to me that one important fact has scarcely received due attention. Certain gaily-coloured, or or least conspicuous, flowers are avoided by bees, or, if visited, have an injurious and even fatal effect upon the insects. Among these are the dahlia, the passion-flower, the crown-imperial, and especially the oleander. That the flowers of the dahlia have a narcotic action both upon humble-bees and hive-bees was first pointed out by the Rev. L. Jenyns, in his "Observations on Natural History" (p. 262). He mentions that bees which visit these flowers are "soon seized with a sort of torpor, and often die unless speedily removed," &c.'

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"As regards the dahlia, this is so directly opposed to my recent experience in this country that I should like to record the following observations.

"I was staying at the hill-station of Mussoorie in September and October of last year,—a time when the wild dahlias* were at their greatest perfection, and formed a striking feature in the scenery,—there were numbers of other wild flowers of various species in profusion, but the dahlias formed the particular attraction of the Aculeate Hymenoptera, and my richest collecting ground was always where the dahlias grew thickest, my most favoured spot and warmest corner being at a place called Wolfsburn Road, Laudun, where I could stand up to my waist in a rich bank of dahlias of all colours, and collect around me in the shortest possible time the greatest number of specimens and variety of species to be obtained anywhere in or near Mussoorie. I am not certain of many of the species captured, but the following genera were strongly represented, especially the first three:—*Bombus*, *Apis*, *Vespa*, *Andrena*, *Halictus*, *Prosopis*, *Polistes*, *Odynerus*, and others; besides which, had I been collecting them, I might have taken many species of butterflies, day-flying moths, ichneumons, as well as several species of Diptera and Coleoptera. The dahlias were mostly single, but a few double ones were also to be found. The bright yellow single flowers appeared to be the most attractive—that is, in taking up my position on the steep bank I preferred to plant myself in a mass of yellow flowers to any other colour. I never observed that any bee, wasp, or other insect was injured in any way by visiting these flowers. I never found a dead one in or under the dahlias, and certainly, from the activity required to capture them, I never came across any bee or wasp suffering from 'narcotic action' or 'seized with a sort of torpor.' Under one fine bush of the yellow single flower I found the nests of a large species of humble-bee, and spent many hours in watching the workers fly in and out and to and from the dahlia flowers covered with the yellow pollen, and they never seemed any the worse for their excesses; indeed they were uncommonly lively, and on one occasion, when I had been capturing too many of their fine females, the workers fairly drove me off the ground by their most persistent attacks."

Papers read.

The Secretary read a paper, by Mr. Peter Cameron, entitled "Notes on the Coloration and Development of Insects."

Professor Westwood communicated two papers:—"On two Gynandromorphous specimens of *Cirrochroa Aoris*, Dbl., an Indian Species of

* Mr. Rothney must be mistaken in speaking of the "wild dahlia" in India, as this plant is Mexican, and not Indian, as pointed out by several Members on hearing the above communication.—Ed.

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Nymphalideous Butterflies," and "On *Cetonia Aurata* and *Protaetia Bensoni*." Specimens and drawings, showing the specific distinctness of the insects in question, were exhibited in illustration of the last-named paper.

New Part of 'Transactions.'

Part I. of the 'Transactions' for 1878 was on the table.

May 5, 1880.

H. T. Stainton, F.R.S., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of a Member.

Mr. Peter Inchbald, of The Lodge, Hovingham, York, a former Member, was ballotted for and re-elected into the Society.

Exhibitions, &c.

Mr. W. C. Boyd exhibited a very pale specimen of *Nyssia hispidaria*, taken at light at Cheshunt Station.

Mr. M. J. Walhouse exhibited some Geodephagous beetles which were found only on the summits of some of the highest mountains in India.

Mr. W. L. Distant exhibited a long series of specimens of the Madagascar Homopteron *Ptyelus Goudoti*, Benn., to illustrate the extreme variability of the species. The series showed a gradation from melanic forms having the tegmina and pronotum black, to an albinic variety in which the tegmina and pronotum were pale luteous. One specimen was asymmetrical in the markings of the tegmina, thus possessing the characters of two varietal forms, as shown in the accompanying woodcut.

Mr. Distant observed that he had found this not at all an exceptional occurrence in extremely variable species of the order *Rhynchota*. Like other species of this and allied genera, *P. Goudoti* in the larval condition

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emits a frothy secretion, which M. Goudot described as being done so plentifully at the time of the greatest atmospheric temperature, as to assume the appearance of actual rain. From an experiment made with sixty or seventy larvæ, M. Goudot concluded that a vessel holding nearly an English quart could have been filled with this secretion in an hour and a half.

Mr. Stainton pointed out that this series offered a good illustration of the danger of founding a species on a single specimen.

Mr. T. R. Billups exhibited two living specimens of *Carabus auratus*, found in the Borough Market, and probably introduced with Belgian potatoes.

Mr. F. P. Pascoe stated that he had recently heard a rumour to the effect that the Sphinx-moth with a proboscis of sufficient length to reach into the nectar of *Anagræcum sesquipedale*, predicted by Mr. Darwin and Mr. Wallace to occur in Madagascar (see also Proc. Ent. Soc. 1878, p. iii.), had actually been captured in that island, and he asked whether any Members of the Society were able to confirm this statement.

Mr. M'Lachlan remarked that as a believer in the doctrine of Evolution, he thought that much harm was done to it by its friends, of which this was, in his opinion, an example.

The Chairman asked whether any Members had observed the date of appearance of insects this season.

The Secretary stated that a copy of a work, edited by Miss Ormerod, had just been presented to the Library by its Editor, in which an immense number of meteorological observations had been tabulated, in such a manner as to lead to the hope that some light might be thrown by this and future work conducted on a similar plan on the connection between meteorological phenomena and the appearance of insects, &c.

Miss E. A. Ormerod remarked that the records from which the 'Cobham Journals' had been reduced were taken by Miss Caroline Molesworth at Cobham, Surrey, and extended, with more or less completeness, over a period of about forty-four years. The coincident observations of weather and the state of animal and plant life in a continuous form extended over only about twenty-six years,—from 1825 to 1850 inclusive,—and the present volume contained the reduction of these observations as far as they bear on these points of coincidence. One object in view had been to give by abstracts and summaries such a statement of the successive states of temperature, amount of rainfall, and direction of the wind, as would enable the reader to see, by a glance at the parallel columns of each month's entries, what periods of marked variation or non-variation occurred in what is commonly known as "the weather." The tables given in the work had been directly reduced from Miss Molesworth's careful records preserved in the library of the Meteorological Society, and Miss Ormerod, the Editor of

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the 'Journals,' had added an introduction giving the necessary working details, together with a chapter of "Results of Observations," working out the coincidences that appeared between meteorological and phenological conditions—*i. e.*, between states of weather and subsequent dates of plant-life, the appearance of spring birds, &c. Miss Ormerod added that, from an entomological point of view, it was much to be regretted that Miss Molesworth, who was remarkable for the extreme accuracy of her observations, did not give more records regarding insects. There were, however, a few, and one of special economic interest, in which the larvæ of the "Turnip Sawfly" are noticed as causing damage in August: at the beginning of September there occurs an entry of "myriads of *Haltica nemorum*," and after a fall of rain which cleared them away, the "Turnip Sawfly" appeared in the imago state on the same ground, showing that the rainfall had no beneficial effect in preventing their development. Miss Ormerod stated, in conclusion, that from one series of records spreading over such varied and important branches of observation, no certain conclusions could be at present drawn, but the work in question might offer valuable suggestions for future observers. The results of similar records carried out hereafter may throw much light on the meteorological principles of cultivation, and Miss Molesworth, who was one of the first to lead the way in the path of joint observation, deserves our grateful remembrance.

June 2, 1880.

Sir John Lubbock, Bart., M.P., F.R.S., &c., President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Members.

Miss Georgiana Ormerod, of Dunster Lodge, Spring Grove, Isleworth, and Mr. Henry Lupton, of the Elms, Chapel Allerton, Leeds, were ballotted for and elected Ordinary Members.

Exhibitions.

Mr. M. J. Walhouse exhibited a collection of moths from Mangalore, on the Malabar coast, India. Many of the species showed a great resemblance to European forms.

Mr. J. A. Finzi exhibited, on behalf of Mr. Lowrey, a bred specimen of *Arctia fuliginosa*, with only one antenna.

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Sir John Lubbock stated that he had occasionally bred ants with only one antenna, and on one occasion had possessed a specimen with no antennæ at all, this individual being completely helpless when out of the nest.

The President also exhibited specimens of a new Australian ant which he had received from Mr. Waller, and which agreed with the remarkable genus *Myrmecocystus* of Wesmael in having an immensely distended abdomen, so that the insect actually serves as an animated honey-pot. The present species, however, belongs to a different genus, and is allied to *Camponotus*.

Paper read.

The Rev. H. S. Gorham communicated the concluding portion of his "Materials for a Revision of the *Lampyridæ*."

July 7, 1880.

J. W. Dunning, M.A., F.L.S., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Exhibitions, &c.

Mr. Jenner Weir exhibited, on behalf of Mr. J. W. Douglas, a worn female specimen of *Noctua C-nigrum*, which had been taken on June 27th.

Mr. M'Lachlan exhibited a piece of sugar-cane from Queensland much damaged by some Lepidopterous larva, of which specimens were also exhibited. Without having the moth, it would be impossible to decide with any certainty as to the species; but, judging from the larva, he was inclined to believe that it was a species of *Pyralis*. On consulting with Miss Ormerod, he had come to the conclusion that the species was not the same as the "cane-borer" from British Guiana.

Mr. W. L. Distant said that he was acquainted with the "cane-borer" from Madras, and that it was not the same species as that described by Guilding.

Mr. W. F. Kirby called attention to the description and figure of *Pyralis saccharalis*, Fabr., published in 'Skifter af Naturhistorie Selskabet,' vol. iii. part 2 (1794), pp. 63–65, pl. vii. fig. 1, where the insect is represented in all stages. He also referred to the long account of the insect given by Guénée in Maillard's 'Notes sur l'Ile de Réunion,' Lép., pp. 68–71. Guénée considers the insect to be allied to *Schœnobius*, and calls it *Borer* (!) *saccharellus*. Fortunately the generic name will not stand, as Guilding's name of *Diatræa* has the priority.

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Miss E. A. Ormerod exhibited specimens of *Tomarus bituberculatus*, *Sphenophorus sacchari* (with cocoon), and *Rhyncophorus* (? *palmarum*, cocoons and pupa), and read the following note:—

"*Cane-borers.*"

"In the course of last autumn it was mentioned to me that, in addition to the species of cane-borer previously noticed, another kind (which was incidentally mentioned to be a *Macraspis*) was doing much harm in Berbice. On examination of the specimens, however (now exhibited), the beetle turned out to be one of the Dynastidæ, *Tomarus bituberculatus*, and any suggestion for diminishing the numbers would be very acceptable. The beetle, which is one of the kinds popularly known as 'hardbacks' in the colony, is enormously plentiful, coming into the houses in the evening in such quantities as to require to be swept from the tables, and I am informed by a naturalist lately resident in Guiana that as many as five specimens may be found in the unopened flower-buds of the *Victoria Regia*.

"The other specimens exhibited are of *Sphenophorus sacchari*, with its cocoon, and also two cocoons (one opened to show the contained pupa) of a larger species of *Rhyncophorus*, but I conjecture not of *Rhyncophorus palmarum*. In the course of investigation last year it appeared that there were more species at work than was at first supposed. One of these, kindly lent me for examination by the Colonial Company, much resembles *R. palmarum*, but is smaller, and, after careful search and comparison of specimens,—in which I was kindly assisted at the British Museum,—appears to be undescribed. It is very like *R. Zimmermanni*, but is not identical. A very few specimens, bred by Mr. D'Urban, of Exeter, from imported canes, appear to be of yet another species, but I only know these by report.

"Larvæ of the large *Rhyncophorus*, and of the *Sphenophorus sacchari*, have been exhibited before; but I show them now relatively to a peculiar formation frequently noticeable in the larger grub,—of which some lumps will be noticed at the bottom of the bottle (this is whitish and hard when in the grub preserved in spirits),—and I benefit by the examination kindly made of it by Mr. Meldola to mention that it is of the nature of a true wax, and may be derived from *cerosin*, a natural wax found in sugar-cane, investigated by Avequin and Dumas, and here conjecturally altered by the digestive processes. The taste of this secretion (which perhaps I should mention was, after some preliminaries, *my* part of the experiment) was exceedingly sweet, and throws some light on the fondness of the natives, and also in some cases of the residents, for these grubs, as matter of food. I am informed they are partaken of fried or 'plain boiled,' and all mashed up together, and as many as 120 are eaten at a sitting! As this formation of sugar melts at a very low temperature, probably the operation of cooking

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disperses its sweetness through the mass; nevertheless the dish appears somewhat uninviting.

"To return, however, to the attacks of the cane-borer in Demerara; these were lessened for a time, but are still in action to a much greater extent than could be wished. Many experiments have been tried, and amongst others it is noted with regard to powers of endurance that it required 10 parts of sulphuric acid to 100 of water to kill the small borer (*Proceras*), and 30 parts acid to 100 of water to kill the large kind—locally the 'tácuma,' scientifically the *Rhyncophorus*. The application of chemicals is, however, scarcely practicable. From the size and extent of the crop, and the fact of the borers being inside when at work, it is very hard to get at them, but nevertheless systematic care seems to be doing something.

"The points that appear especially to be attended to beneficially are, first, with regard to what are termed 'tops,' that is, the long pieces of cane-cuttings put in to form the new plants. These are carefully watched, and, if symptoms of the borer appears, are removed. Another point is cutting out infested pieces from the crop-plants; in this way the insect presence is diminished, and by putting the removed cane through the mills enough is got from it to pay expenses. Attention is also directed to destroying refuse cane, which otherwise would accumulate, and, by attracting borers, form centres for new hordes to come out from.

"These points are all of great importance, and can be worked practically; but for the constant watch on the borers necessary to keep them down, it seems that the only sure protection lies in encouragement of their natural enemies, and especially the ants, which form a kind of insect police, constantly and very efficiently on the look-out.

"After discussion of the subject last year (following on the very judicious suggestions of some of the residents in the colony), the Colonial Company issued orders that no more ants' nests should be burned. These natural protectors require some special care themselves, as, in addition to the clearing of their nests by fire in process of cultivation, it is a custom to burn them in order to drive away mosquitoes by the peculiarly pungent and unpleasant smell thus produced.

"The protection, it may be hoped, will bring the average ant presence up to the previous amount, for there seems no doubt of their usefulness. I am informed by various residents (whom I have been in communication with whilst they were in England) that when unchecked these ants are immensely numerous; to be found in nests at the foot of the cane, and also on the canes; and that if some pieces of the cane are thrown down ants will directly be seen streaming to them from all quarters; and in this way they are always at hand to attack the eggs or young grubs before they have made their way into the cane, or again on their exit from it before going into the pupal state. They appear to me the only check applicable to the

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cane-borer moth, *Proceras sacchariphagus*, in its imago form, in which, from the observations made in Mauritius, it appears to be remarkable for its sedentary habits, remaining motionless for a large portion of its short life in the shelter of the leaves.

"The life-history of the moth has been already given by various writers, but there is so much of interest in the very long notes of it given by Mr. W. Bojer, the President of the Committee appointed by the Governor of the Island of Mauritius to investigate the subject and suggest a remedy, in the autumn of 1848, on the first burst of the alarm, when the moth was found to have fairly made good its footing in Mauritius, that, as the original documents are somewhat difficult of access, and the numbers of the 'Sugar-Cane' and the 'Royal Gazette,' in which they are reprinted, appear to be almost equally so, I venture to give some points from the Report.

"It appears that the presence of this moth was not known of in Mauritius, either by any planter or by any naturalist familiar with the local Entomology, until November, 1848, when, with a view to regenerate the canes of the islands (then diseased in another way), a quantity of new canes were sent for from Ceylon. Before the arrival of these canes a report was circulated that Cingalese canes were infested by a borer. On their arrival examination was made by a Committee appointed for the purpose, and almost all these newly-imported canes were found to be perforated by the moth cane-borer. The immediate destruction of the canes was recommended, but it is conjectured that some left temporarily in an accessible spot were carried off and planted, for two years afterwards the moth made its appearance.

"The notes from Mauritius agree with most of those from British Guiana as to the moth-egg being laid on the cane-leaves; the caterpillar feeding in the cane, and subsequently coming out again and turning to pupa in a slight web amongst the leaves. The eggs are stated to be transparent, their greenish colour making them difficult of observation on the cane-leaf; their shape is depressed and oval; their longest diameter is stated to be the third of a line.

"The only moth observed in the act of oviposition deposited 162 eggs, which were placed in two parallel rows and hatched on the ninth day. Their extreme transparency allowed of observations of the development of the caterpillar in the egg. On the second day an opaque line was noticed, indicating the first appearance of the digestive organs. On the next day a small black point at one extremity of the line indicated the future head; later the body of the insect became more apparent; movement became visible, and its position is stated to have been coiled on itself with the head in the centre. The length of the caterpillar on coming out of the egg on the ninth day is given as 1¼ line.

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"When the caterpillar has reached full development, which is at the end of about thirty-one days, it is 12 to 14 lines in length, and its movement is described as being very quick in either direction, whether forward or backward. The head is depressed, furnished with strong toothed jaws, and with a plate of a paler colour. The labrum is said to have a very hard lance-shaped termination, which helps it to perforate the cane.

"'Each segment has four black glands in a longitudinal row on each side of the back marked by a pink band. On the lateral sides are also seen eight black points surrounded by glands of the same colour, united also by a pink band.' These points are the breathing pores. The glands are usually terminated by bristles.

"The caterpillar changes its skin five times before metamorphosis, and when about to turn it leaves the inside of the cane and lightly spins a few of the leaves together for a protection. The caterpillars that from any cause remain to undergo pupation in the cane appear usually to perish from the humidity and unsuitableness of position, or from *Acari*. Several hundred chrysalides taken from inside cane were found on inspection to contain *Acari* instead of the future moth.

"The existence of the insect is computed at nine days in the egg, thirty-one as a caterpillar, fifteen as a chrysalis, and four or five in the imago state—about sixty days altogether; and as in the mildness of the Mauritian climate reproduction takes place at all seasons, the increase is very rapid.

"Details regarding these small moths have been so fully given elsewhere that I need not enter on their specific description, but their appearance when in repose is stated to be very singular. The inferior palpi are stated to be nearly three times the length of the head, projecting forward in the shape of a beak. The anterior legs are without spines, and when the moth is at rest are directed forward parallel to the beak-like palpi, and in addition to the great black eyes which distinguish this moth, and the antennæ laid flat against the wings, which they exceed in length (but which are raised at a right angle when on the point of flying), are remarked as giving the insect 'a very peculiar, not to say sinister look.'

"From observations made on the moth in captivity, it is stated to be very sedentary in its habits, remaining fixed in the same place for thirty-six hours concealed between leaves without even changing its position. Its flight is heavy and almost vertical; but when tormented at night by a vivid light, it jumps and turns on itself very quickly, and if set at liberty—far from being attracted by the light of a candle—conceals itself in the darkest corner of the room. The writer observes, 'This peculiarity has confirmed us in our first impression that its large eyes are totally deprived of the choroid membrane, which renders it almost blind.' It is also noted that

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the moth had not then been captured in the cane-fields—conjecturally from it remaining hidden under the leaves.

"The report quoted runs to considerable length, but I have given these few points as they seem of practical importance.

"The habits as mentioned agree with those noted of the moth cane-borer from Demerara, even in the matter of difficulty of capture, and this quiescent state in the shelter of the leaves and immediate concealment on disturbance, puts it on the one hand almost *out* of reach of destruction by the usual artificial means of attraction; and, on the other hand, puts it very much *into* the power of the ants, stealing quietly into every nook to lay hold of and destroy it.

"Effects of weather and state of health of the plants appear to act strongly on the borers generally, the attacks being noted as worst in seasons of drought; this, apparently (as with some of our English attacks), from the dry weather, and state of the plant-juices being favourable to the insects, and also from the plants not being able to make way against them, or 'grow past,' as it is termed.

"This point is worth notice, relatively to what may be found to answer from increased irrigation or anything keeping up the vigour of the plant as stimulant application; and I may observe that in an experiment instituted with regard to the effects of the mixture known as 'Soluble Phenyle,' this was applied in dilute form with ash of the burnt canes, and whether from the ash or the 'phenyle,' or both, a growth was reported of a remarkably healthy green, and although the difference in amount of insect presence accompanying was not great, it was certainly less."

Mr. W. L. Distant stated that he had had some experience in sugar-cane growing in Malacca, and he was of opinion that the remedy for exterminating the borers lay with the planters themselves. The necessity was to burn all the refuse "trash" from the canes, as was done on the largest estates, and not allow such to accumulate, as frequently took place on badly managed plantations. He had only that day been discussing the matter with a large cocoa-nut palm grower of Malacca. That palm suffers severely from the depredations of two beetles, *Xylotrupes gideon* and *Oryctes rhinoceros*, and the principal defence is to prevent the accumulation of vegetable refuse. Frequently Chinamen who had adjoining plantations would allow "paddy" husk, or sawdust, to accumulate, thus affording breeding grounds for these destructive insects, to the injury of all the surrounding estates.

Miss Ormerod stated that the planters in British Guiana had now become aware of the importance of not allowing refuse to accumulate.

Mr. M'Lachlan was of opinion that the cane-borers could be entirely

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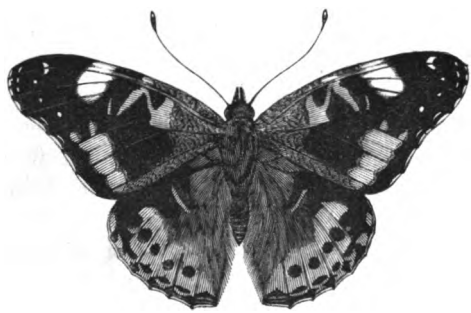
exterminated by weeding out and burning the canes as soon as they showed any symptoms of being infested.

Mr. W. L. Distant exhibited a specimen of the so-called "vegetable caterpillar" from New Zealand, procured for him by Dr. Dunkley. This is the larva of a moth, *Hepialus vivescens*, on which the spores of *Cordyceps* (*Sphæria*) *Robertsii* frequently fall, becoming truly vegetable parasites, destroying the caterpillars, and growing therefrom in the form which has caused so many erroneous statements to be made. This caterpillar feeds on the Convolvulus (native potato).

Mr. T. R. Billups exhibited a larva of *Plusia chrysitis* and some specimens of an Ichneumon that infested it. He stated that 120 of the Ichneumons had emerged, and that he had identified them as a species of *Paxylloma*.



Mr. A. Phipson exhibited a remarkable variety of *Pyrameis cardui* taken near Basingstoke last August. (See fig.)

Papers read, &c.

The Secretary read the following note by Mr. Sidney Churchill, of Teheran :—

"*Note on Argas Persicus.*"

"M. Fischer, of Waldheim, in his 'Notice sur l'Argas de la Perse,' p. 14 (Acad. de Moscow, 1823), remarks :—'C'est la punaise vénimeuse de Miana des voyageurs et dont on a tant exagéré les accidents. Il a le corps ovalaire allongé, plus rétréci en avant que la punaise des lits, avec laquelle ou l'a comparé ; tous le dos garni de petits grains blanchâtre, commes chagrinés ; le bord très peu ourlé, un peu enchancré, bi-latéralement en avant ; couleur d'un rouge sanguin clair, parsemé sur le dos de points élevés blancs ; pattes pâles.' M. Adouin has classified the species found by M. Savigny in Egypt under the head of *Argas Persicus*. But that species is oval, whereas both

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Baron Walckenaer, in his 'Histoire Naturelle des Insectes' (Paris, 1844), and Gervais describe the Persian *Argas* to be truncated. The characteristics assigned to it by Baron Walckenaer are as follows:—'Mâchoires en sucroire, non engainées par les palpes, et cachées ainsi que ceux-ci au-dessous d'une avance de la partie antérieure du corps; dessous du corps granuleux, non écailleux, et d'une seule pièce; pattes bi-onguiculées, non vésiculifères.'

"My own inquiries in some respects agree with those of M. Savigny, who made a careful study of this insect. He says that they are more frequently parasites. A Persian remarked to me that the small species are found on the bodies of fowls and other larger birds, and that afterwards when nearly grown up adhere to walls, from which, during the hot summer nights, they sally forth in quest of food. The theory of the natives is also that during the winter the *Argas* lives on the fowl, thus accounting for its disappearance; but that during the summer, the air being hot, they live during the day on walls, and come forth at night. But the theory that the Miana bug is a parasite of the fowl can hardly be credited; else how is it accounted for in such isolated and far-apart places? The fowl is domesticated all over Persia, and not in the few places where the Miana bug is met with, such as at Miana, on the post-road between Teheran and Sabreez, where it is called Melleh, specimens of which I hope shortly to be able to procure and forward to the Society for examination; at Mazrah, on the Resht-Teheran post-road, from whence were procured the five specimens forwarded. Dr. Pollak, recently Professor of Medicine in the Polytechnic at Teheran, describes the Miana bug as the 'Kench'; but this latter corresponds to *Ipodes ricinus*, the sheep-tick. The *Argas* is also found at Chesma Ali, near Asterabad, at Shahroud, in Khorassan, and at Kashan, where it is severally known as the 'shebgaz,' or night bug, and 'careebgaz,' or stranger bug, being said not to sting the natives.

"Dr. Schlimmer, some time Professor of Medical Jurisprudence in the Military College here, in his 'Terminologie Medico-Pharmaceutique et Anthropologique,' has a note on the *Argas*, in which he says:—'I think it is a mistaken idea that the natives of Miana are not bitten by this wretched bug. I fancy that once in their lives they were bitten without having noticed it,—for instance, whilst a suckling, or in early youth, or perhaps without remembering it,—and are on this account rendered insusceptible of a second bite. I base,' he continues, 'this theory on my own experience. At my first visit to Miana, I myself suffered acutely from the bite of this venomous insect; but on a second and third visit I am not aware of having been bitten; further, in over eight hundred cases of bites from the violent black scorpion of Persia which have come under my notice, I was unable to discover the man who remembered a former bite during his lifetime. It would appear from this that the poison once inoculated into the system

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renders one insusceptible to a succeeding attack, acting like vaccine against smallpox.' It may be well to remark here that a popular Persian remedy against the *Argas* bite is to roll in a piece of sweetmeat, or otherwise a bug, and administer it when the recipient is about to go on a journey where he is likely to come across them. He goes on to say:—'At all events, the symptoms produced by the bite of the *Argas* of Miana are strikingly similar to those of remittent fever—extreme lassitude, loss of appetite, disgust with one's work, producing yawning, with great heat and partial perspiration, but little thirst, dissatisfaction and soothing sensations at certain hours of the day.'

"These symptoms have been attributed to malarial fever to which strangers would be subject, while the natives would be spared; but the natives do not present that appearance of being subject to Paludian fevers which natives inhabiting malarially disposed places bear. At Shahroud, Miana, Mazrah, Kashan, &c., where the *Argas* exists, malarial fever is scarcely known, which is quite enough to show that the symptoms above described are produced by the bite of the *Argas* itself. A victim of the latter thus describes his sufferings:—'The first day I perceived several small punctures; second day, black spots replaced the punctures, delirium ensuing, white matter oozing from the punctures; delirium followed by intermittent fever. Ipecacuanha and quinine, in large doses, administered without effect; patient given up by doctors; finally, bitter decoction of pomegranate peel completely cured patient.' Another popular remedy of the Persians is to administer copious draughts of milk, then to tie patient into a kind of netting to a tree, and keep turning net round, letting it unwind of its own accord. This treatment produces violent vomitting, and ninety-nine patients out of a hundred die through it.

"Maurice Kotzebue, who is quoted by M. Fischer, mentions two cases; in the first the patient experienced throughout his body a violent heat, and was prostrated into a sort of delirium, expiring shortly in dreadful convulsions. The second case was communicated to him by Col. Baron Wrede, Russian Minister at Teheran. He arrived at Miana late in the season, and, fancying himself free on that account, passed a night there, but took the precaution to keep a candle lighted all night. He himself was not bitten; but one of his retinue, a Cossack, had a black spot on his foot, had delirium, and was prostrated in a violent access of madness. The natives advised the usual remedy—to kill a cow and wrap the poisoned limb in its warm hide. But this expedient proved fruitless. As a rule, this treatment is said to be attended with success, but the poor Cossack died soon after in fearful agony. Should this latter treatment prove successful it is necessary to adopt a strict diet of sugar and water and honey for at least forty days; meat and alcoholic drinks must be totally abstained from.

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"The Miana bug is generally found in old habitations and in holes in walls. It is rarely seen during the day, particularly disliking light, even at night; notwithstanding which candles and lamps do not always stop them from biting one. In the winter they remain inactive, being particularly venomous during the great summer heats. From time immemorial Miana has been affected by them. Death has been known to ensue from their bite in less than twenty-four hours."

Mr. Roland Trimen communicated the following notes:—

"*On the pairing of a Butterfly with a Moth.*

"Colonel J. H. Bowker, F.Z.S., lately sent me from D'Urban, Natal, a small *Salamis Anacardii* (Linn.), with an account of its capture by him *in copulâ* with a female *Aphelia Apollinaris*, Boisd. Col. Bowker wrote, on 9th February, 1880:—'On January 24th, at Umgeni Hill, I was following a butterfly into a bush cutting, when I saw two large butterflies come fluttering down from the upper branches of a tree into an undergrowth of thorny twigs. I took them for *Anacardii in copulâ*, and immediately went to secure them. Although I advanced to within a foot of the pair, it was so difficult to get at them with the net that I looked very carefully to see how I could secure them; and you may guess my astonishment on perceiving that the two were *Anacardii* and a large white moth! At first I thought it was a fight; then that they might be in the clutches of some leaf-like or stick-like *Mantis;* but the longer I looked the clearer the case became. *Anacardii* (male) was holding on to a small branch, while the moth with drooping wings was hanging head downwards; the latter was a perfect specimen, soft and fresh from the pupa. After satisfying myself as to the true state of the case, I tried to capture them, and at length succeeded in getting hold of *Anacardii* by the wings, and began drawing the pair towards me. Just as I thought I was sure of them, and was about to pop them into my net, the moth made a violent struggle and got away; and, though I followed her up, I lost her round a corner of the bush. I am sorry that I can thus only send the butterfly, but the moth with closed wings that I forward is of the same species as that concerned. This moth flies by day, and is often playing about among butterflies; it was very numerous on the occasion I am writing about. You will observe the likeness it bears to *Anacardii*, especially in the little ringed eyes on the wings.'

"The likeness here referred to by Col. Bowker is a very general one, but quite noticeable, the general whitish colouring of the moth resembling that of the under side of the butterfly, and its yellow spots in fuscous rings being very similar to the more complicated ocelli of *Anacardii*. The *Anacardii*, in this instance, is an unusually small male; and it seems to me

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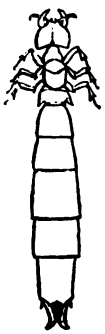
not improbable that he mistook the *Aphelia Apollinaris* (a large broad-winged, active day-flying insect) for a female of his own species; as I once saw, at Natal, the male *Diadema Misippus* for a long time pursue a female *Danais Chrysippus*, though in this case no union ensued. *Aphelia* is usually located among the *Saturniidæ*, but it presents points of affinity to the *Liparidæ* also. *A. Apollinaris* is in both sexes often yellow instead of white; its wings are subdiaphanous, and almost identical on both surfaces as to colour and pattern. It is so active in the day-time as constantly to be mistaken for some species of *Pieridæ* among butterflies."

"*On a supposed Female of* Dorylus helvolus (Linn).

"The gravid female ant, of which a rough outline is here given, was brought to me by Mr. C. A. Fairbridge, Senior Trustee of the South-African Museum, on the 29th May, 1880, with the information that it had been dug out from a nest of small red ants on his premises at Sea Point, close to Cape Town. These small ants were a nuisance, and he was obliged to order the destruction of their nest; but, with his wonted attention to all matters of zoological interest, he instructed the man charged with the work to look for and secure the large female or females which probably inhabited the depth of the nest, and the single specimen figured was dug out. It is a very remarkable insect in appearance; in colour chestnut-red, paler on the abdomen, and very highly polished throughout, especially in the abdominal region. There is no trace of eyes (compound or ocelli) on the globose subcordate head. The antennæ are 8—9 jointed; the mandibles strong, curved, acute, without tooth; these two pairs of organs very like those of *Dorylus* (male), but shorter and thinner. All the males are like those of *Dorylus* (male), but the femora more attenuated; the thorax shaped very similarly to that of the figure (F. Smith, in Cat. Hymen. Brit. Mus.) of *Anomura* worker, but considerably wider in proportion to the head; peduncle of abdomen wider than thorax, its posterior angles outwardly acuminate; rest of abdomen greatly widened (the segments 3, 4 and 5 being the widest and much flattened), and terminating in a pair of strong, horny, fuscous processes; the entire abdomen more than three times as long as the head and thorax together.



"This specimen was slightly injured about the anal extremity, to which some viscid matter and grains of earth were adhering. On removing this secretion I found and removed three small reddish worker ants entangled in it, one of them still alive. These measure only about 1½ line in length, and were found under the lens to be eyeless, and in general structure close to, if not identical with, *Anomura*. Through one of the horn-like abdominal

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plates, the eggs massed within the body of the gravid female could be distinctly seen under a low power. The female was alive when brought, and remained so until this morning (31st May): she manifested more activity than her long heavy abdomen would have led one to expect; no doubt the very high polish of the under surface aided locomotion. The thoracic structure seems quite to negative the probability of this female having possessed wings."

Messrs. F. Du Cane Godman and Osbert Salvin communicated "A List of Diurnal Lepidoptera collected in the Sierra Nevada of Santa Marta, Colombia, and the vicinity."

New Part of 'Transactions.'

Part II. of the 'Transactions' for 1880 was on the table.

August 4, 1880.

J. W. Dunning, M.A., F.L.S., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Exhibitions, &c.

Sir Sidney Saunders forwarded for exhibition four living specimens of *Prosopis rubicola*, all stylopized females recently bred from larvæ extracted from briars received from Epirus; each of these small bees bearing the projecting puparium of a male *Hylechthrus*, and in one instance two of the latter. He also communicated the following notes thereon:—

"In their pupal nymph-condition these bees had become considerably distended and yellow (instead of opaque white), their apparent discomfiture from the presence of these internal parasites seeming to account for the usual appearance of stylopized specimens before others. Immediately on divesting its pupal pellicle, when the imago *Prosopis* is soft and moist, the parasitic larva protrudes between the abdominal segments its white head, which soon assumes a castaneous tinge; and about the third day, when the integument has become more or less corneous, an internal separation takes place, whereby the apex becomes semi-transparent, the pseudo-pupa retiring within to undergo its metamorphosis as a true pupa or nymph. This intermediate stage corresponds with that which Fabre has described as the 'troisième larve' in *Sitaris* and *Meloë*, exhibiting within its puparium (the indurated larva-skin) a sluggish movement for

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a brief interval, during which period the second larval form is closely imitated, followed by a moult; after which the true pupa is developed, having all its members severally swaddled in another pellicle, to be again discarded on attaining the perfect state, when the black head of the imago (in the *Stylopidæ*) is thrust forward to the apex of the puparium, about the eighth day after the protrusion of the latter as aforesaid.

"This larviform condition of the pseudo-pupa in *Hylechthrus* I have verified by extraction, such preliminary stage serving to complete the analogy with the *Meloïdæ* in other respects.

"The *Prosopis communis* having been found stylopized in England, its ordinary parasite, the *Hylechthrus*, may not improbably be discovered in connexion therewith, by collecting the larvæ of the former from desiccated briars, dock stems, and other known habitats, and keeping them on cotton-wool until maturity."

A collection of such larvæ and nymphs from Epirus was also exhibited, including one of the latter (placed apart) distended and yellow, about to produce a stylopized imago.

Miss E. A. Ormerod exhibited a soft, fleshy, gall-like formation found on *Rhododendron ferrugineum* at Merton, and believed by Dr. Thomas to be a fungoid growth.

Mr. Fitch stated he had often possessed specimens of this supposed gall, and had attempted in vain to breed an insect from them; he was therefore disposed to concur in Dr. Thomas's view.

Mr. T. R. Billups exhibited a specimen of *Heptaulacus villosus* from Box Hill.

Mr. C. O. Waterhouse stated that about five years ago he had taken from forty to fifty specimens of this rare beetle in a chalk-pit in Freshwater Bay.

Papers read.

Mr. H. J. Elwes communicated a paper "On the Genus *Colias*," and Mr. W. L. Distant read a paper entitled "Notes on Exotic *Rhynchota*, with descriptions of new species."

September 1, 1880.

H. T. Stainton, F.R.S., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

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Election of a Foreign Member.

Miss Emily A. Smith, Assistant State Entomologist of Illinois, of Peoria, Illinois, was ballotted for and elected a Foreign Member.

Exhibitions, &c.

Mr. J. Jenner Weir exhibited a male *Odonestis potatoria* having two-thirds of the upper wings of the yellow colour of the female, and a female of the same species of the usual dull red colour of the male: also a male *Smerinthus populi*, having the wings almost without markings, and of the light colour generally found in the female, the right antenna being clubbed at the extremity, and not pointed as usual.

Sir Sidney Saunders exhibited six winged examples of the Stylopideous genus *Hylechthrus*, five having been obtained from the specimens of *Prosopis rubicola* exhibited alive at the last meeting, one of the latter having produced two of the former. Four adult larvæ of males were found in another of the same bees which became arrested in its development in the pupal stage. He also exhibited several of these bees having females of *Hylechthrus in situ*, and the puparium of a male extracted entire with the imago enclosed therein; also various Hymenoptera obtained from the same briars, among which were specimens of the Chalcidideous genus *Melittobia*, and a new species of *Scleroderma*.

SCLERODERMA EPHIPPIUM.

Capite pedibusque nigro-piceis, genubus tarsisque pallidis; thorace flavo, mesothorace antice lateribusque fuscis; abdomine nigro-piceo; facie, mandibulis, et antennis flavis.

Long. corp. 3—3½ mill.

Four other species of *Scleroderma* from Greece are recorded in Professor Westwood's monograph of this genus published in the second volume of our 'Transactions,' 1837—1840. This species is also met with in Corfu in the dry snags of fig-trees during winter.

Miss E. A. Ormerod exhibited some galls found on *Tanacetum vulgare*, and stated that Mr. Fitch had obtained some of a similar kind last year near Maldon, Essex; but the present specimens were peculiar from the gall-growths being not only in the axils of the leaves, but also on the midribs and pinnæ and on the inflorescence. The galls on the leaves are smaller than the others and solitary; those into which the axillary growth of shoots has merged itself are for the most part confluent, forming bunches of as many as seven solid bell-shaped galls grown together at the sides, or sometimes completely surrounding the main stem. In the inflorescence also as many as six or seven galls may be found on the receptacle of the composite flower,

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these being generally single, but occasionally confluent, and frequently bearing one or more florets on the side of the gall. The galls vary much in size, those on the leaves being only about three-sixteenths of an inch long, whilst the axillary ones are from about three-eighths to half an inch in length, and those on the flowers of intermediate size. The width is also variable, and depends on the condition of the gall; in the normal state it is about three-quarters of the length, and the gall is bell-shaped, swollen at the base and more or less contracted above, but again spreading at the upper extremity, which is prolonged into several pointed segments, giving the gall much the appearance of a miniature seedhead of *Aquilegia* in reversed position. The gall is depressed in the centre between three segments, where it is also covered with white downy hairs. The colour is green, in some cases turning to purple towards maturity. Internally it is fleshy and solid, with one cavity in the middle of the most typically formed galls, but from their distortion and confluence there may be more. In some of the specimens this chamber communicates by an aperture with the downy depression above, and contains a brilliant orange or scarlet larva, much resembling that of a *Cecidomyia;* whether it is of that genus remains to be seen, as apparently the gall and its tenant are as yet undescribed. The specimens exhibited were found about the 24th of August on the bank of the Brent Canal, near Brentford, on one clump of tansy growing immediately above the water, and the largest numbers were in the inflorescence of a stem which was lying partly in the water with the flower-head a few inches above the surface.

Mr. T. R. Billups exhibited a female specimen of *Polyblastus Wahlbergi*, an Ichneumon new to Britain, taken at Ashstead. A male had previously been captured by Dr. Capron.

Mr. E. Boscher exhibited living specimens of the two varieties of the larva of *Smerinthus ocellatus*, and read the following note:—

"I exhibited last October coloured drawings of *Smerinthus ocellatus*, showing the marked difference between those feeding on *Salix viminalis* and *S. triandra* (Proc. Ent. Soc. 1879, p. xliv). I have now brought for exhibition some living caterpillars found feeding respectively on *Salix viminalis* and apple. I wish particularly to draw attention to those on the *Salix*, of which I found about a dozen feeding on the same plant, and all marked with brown spots. Others which I found on another species of *Salix*, in an osier-bed some little distance off, were of the ordinary bluish green form without the brown spots, and identical with those found on apples."

Mr. Meldola exhibited some specimens of *Camptogramma bilineata*, a large number of which had been found by Mr. James English near Epping attached firmly to the leaves of the "tea-tree" (*Lycium barbarum*)

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by the abdomen, in which position they had died, possibly from the effects of a fungoid disease.

Mr. A. H. Swinton communicated the following:—

"*Note on Luciola Italica.*

"Towards the end of June the *Luciola Italica* is common along the damp plane-tree walks that border the torrent-bed of the Po at Turin. They commence to glitter at night after the close of dusk under the hanging foliage and along the weedy river-banks, moving in straight lines and emitting an intermittent light, whose fitfulness renders their capture not a little puzzling and difficult. If more closely watched it is found they only fly thus for a little space, and then settle down on the twigs and plants to rest. When introdnced into a room at night and let go, they rise zigzag to the ceiling, and as they dart like miniature meteors their light vacillates from a round fire-globe to a lozenge-shaped nebula. Placed in vicinity beneath inverted tumblers, they flash out their light alternately and responsive. One morning after the enaction of such display, I fancied I perceived an odour of the common puff-ball fungus in the glass where one was confined.

"A luminous Coleopterous *larva* (?) I found in the Island of Capri emitted a light that shone through the chip-box in which it lay. The glow was quenched seemingly at the pleasure of the creature, and seemed to become brighter when the box was disturbed."

October 6, 1880.

H. T. Stainton, F.R.S., Vice-President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Members.

Sir Arthur Scott, of Birmingham, and 97, Eaton Square, W., and Mr. Frank Edward Robinson, of 10, Little Clarendon Street, Oxford, were balloted for and elected ordinary Members.

Exhibitions.

Mr. M'Lachlan stated that last year (Proc. Ent. Soc., 1879, p. xliii) he had exhibited specimens of *Anthocoris nemorum*, an Hemipterous insect, which, under the name of the "needle-nosed flea," had been supposed by a correspondent residing near Canterbury to be damaging the hops in that neighbourhood. At the time of exhibiting the specimens he had expressed

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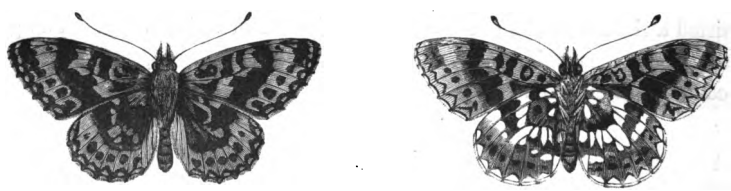
the opinion that this insect was not the true culprit, its habits being probably carnivorous, and he had recently heard from the same correspondent that the hops were much less attacked this year, and that a small larva had been found in the cones on careful examination. Specimens of this larva were now exhibited, Mr. M'Lachlan considering them to be those of some fly, and further expressing his belief that the *Anthocoris* was in search of this Dipterous larva, and was thus of service to the hop-growers.

Sir Sidney Saunders exhibited a series of apterous females of the new species of *Scleroderma* adverted to at the previous meeting, and also a single specimen of the same sex with wings and ocelli, which he had obtained from a number of cocoons closely connected together within the empty cell of a *Raphiglossa* in briars from Epirus. He also explained various circumstances connected with their structure and habits, which, together with a full description of the species, he proposes to bring before the Society in a separate form.

Mr. W. F. Kirby exhibited the following varieties of British Lepidoptera:—

A series of varieties of *Argynnis selene* taken by his son at Dusseldorf. The most remarkable form is shown in the accompanying figures:—



Two hermaphrodite specimens of *Smerinthus populi* bred by Mr. Shuttleworth from the same lot of pupæ.

A dark specimen of *Hemerophila abruptaria*, captured in London by Mr. Olliffe.

An hermaphrodite specimen of *Ennomos angularia*, having one antenna pectinated and the other filiform, bred by Mr. Hudson.

The Rev. E. N. Geldart, who was present as a visitor, exhibited and made remarks upon a variety of *Argynnis selene*, captured on July 5th between Reigate and Betchworth.

Mr. E. A. Fitch exhibited, on behalf of Mr. Theodore Wood, a specimen of *Acronycta megacephala*, with only two wings, having been found in this state on a tree trunk.

Mr. Ralfe, who was present as a visitor, exhibited a specimen of *Vanessa antiopa*, taken on Wimbledon Common, August 24th, 1880; also a specimen of *Acontia solaris* from Eastbourne, captured August 12th, 1880, and a very bleached specimen of *Plusia gamma*, received from some dealer, and of doubtful history.

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Papers read, &c.

Mr. Hildebrand Ramsden communicated the following note on *Pyrophorus causticus*:—

"Having two living specimens of the 'Cucuyo,' or native Firefly of Cuba, it has been suggested that the members of the Entomological Society would be interested in seeing them. Mr. Charles Waterhouse himself identified the species as *Pyrophorus causticus*, Candèze. The insects were captured at Santiago de Cuba on the 4th of May last, and reached England on the 30th of the same month. During the voyage, and since their arrival in this country, they have been supplied with water and sugar-cane or brown sugar. The insects appear to be as well now as when they landed, though they have been in this country over three months. During the daytime they conceal themselves under any covering they can find, remaining motionless and non-luminous till dusk, when they light their lamps and move about. At first it would seem as if motion and luminosity went together and were dependent on each other; but this is not invariably the case, for I have observed the insects become non-luminous while walking away in order to conceal themselves. While engaged in eating they are generally semi-luminous, their lights constantly increasing and diminishing in intensity, and reminding one of the end of a cigar smoked in the dark. In the daytime they become luminous by being excited and made to move about. In addition to the two luminous balls there is a luminous band underneath the thorax, which is, however, only apparent when the insect is in the act of rising to take flight."

Mr. A. H. Swinton read two papers entitled "Some experiments on the variability of Lepidoptera, undertaken during the year 1880," parts i. and ii., and exhibited specimens and figures in illustration.

Mr. A. G. Butler read a paper entitled "Observations upon certain species of the Lepidopterous genus *Terias*, with descriptions of hitherto unknown forms from Japan."

Mr. C. O. Waterhouse communicated a paper "On the *Buprestidæ* from Madagascar," and Mr. F. Moore a paper "On the Asiatic Lepidoptera referred to the genus *Mycalesis*, with descriptions of new genera and species."

Mr. W. F. Kirby called the Society's attention to the circumstance that M. André, who is publishing a work on European Hymenoptera, sometimes prints descriptions of new genera and species which are forwarded to him too late for insertion in the body of the work, not only on the cover of his quarterly parts, but even at the end of sheets of advertisements laid loosely between the pages of a part. He also mentioned that coloured plates of butterflies were published in Paris with MS. names taken from Boisduval's

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collection attached, the species being in most cases well-known forms which had long been properly described or figured by other entomologists.

A discussion relating to M. André's practice then took place, in the course of which remarks were made by Mr. M'Lachlan, Mr. Distant, and other Members, the general opinion being that such a mode of describing genera and species was most derogatory to Science, and that it was much to be deplored that the Society had not the power of enforcing a rule that such descriptions should be ignored by systematists.

November 3, 1880.

Sir John Lubbock, Bart., M.P., F.R.S., &c., President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Members.

Mr. Edward Meyrick, of Ramsbury, Hungerford, Wilts, was ballotted for and elected an ordinary Member. Capt. Thomas Broun, of Auckland, New Zealand, a former Subscriber, was ballotted for and elected an ordinary Member. Dr. E. Brandt, President of the Russian Entomological Society, &c., of the Imperial Medico-Chirurgical Academy, St. Petersburg, was ballotted for and elected a Foreign Member.

Exhibitions, &c.

Mr. C. O. Waterhouse exhibited, on behalf of Mr. Sydney Olliffe, a pair of dwarf specimens of *Epione vespertaria*, taken at Arundel.

Mr. M'Lachlan exhibited some very curious galls on a broad-leaved *Eucalyptus* from Australia. They were of large size, very hard, with four longitudinal keels, each of which was prolonged into a long cornute appendage. The maker of the galls was a Lepidopterous larva, perhaps pertaining to the *Pyralidæ*. When opened the galls gave out a very powerful odour, somewhat resembling that of *Ribes nigrum*, and in all those opened there was what appeared to be an imperfectly-formed pupa of a moth much distended, occupying the whole of the cavity, and always crammed with the developed pupæ of a Hymenopterous parasite of the family *Chalcididæ*. No gall presented any opening whence either moth or parasite could have escaped; but on the crown, between the four horns or processes, there was a very minute orifice, which probably served to admit air, otherwise scarcely obtainable through the thick and hard walls of the galls.

Mr. M'Lachlan then mentioned that he had received a letter from Mr. D. G. Rutherford, from Camaroons, West Africa, in which the writer

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stated that he had taken *Papilio merope* and *P. cenea, in copulâ*, and had obtained eggs and young larvæ therefrom.

Mr. Roland Trimen observed that, to the best of his knowledge, *Papilio cenea*, Stoll, was a form of the female peculiar to the South, and that the female intended by Mr. Rutherford was probably either *Hippocoon*, Fab. (the prevalent West African form), or *Trophonius*, Westw., *var.*, or possibly the somewhat intermediate form named *Dionysos* by Doubleday, also inhabiting Western Africa. In any case the observation was important as confirming the statements as to the polymorphic condition of the female of *merope*.

Prof. Westwood exhibited a globular gall on the surface of a sallow-leaf, made by a species of *Tenthredinidæ;* also a Dipterous larva (*Syrphus*), found closely adhering to the stem of a pelargonium.

Mr. W. F. Kirby exhibited, on behalf of the Rev. J. K. Brown, of Maidstone, a remarkable variety of *Epunda lutulenta;* and, on behalf of Mr. Ralfe, a specimen of *Apatura ilia*, which this gentleman stated he had captured in Pinner Wood last July.

Sir John Lubbock exhibited some interesting larvæ which Mr. Calvert had forwarded to him from the Troad, through Sir J. Hooker. He stated that these larvæ had recently appeared there in great numbers, and were likely to prove most useful, as they fed on the eggs of locusts. The larvæ were, in his opinion, Coleopterous, probably those of a beetle allied to *Cantharis*. Mr. Riley had recently described the transformations of certain insects belonging to this group, and natives of the United States. The young larvæ on first hatching are thin, active little creatures, which eat their way into the cases of locust's eggs, where they rapidly grow into fat, fleshy grubs. Mr. Calvert states that in his neighbourhood a large proportion of the locusts' eggs have this year been destroyed by these larvæ. Sir John Lubbock suggested that if the species does not exist in Cyprus it might be worth while to introduce it there.

Mr. Roland Trimen exhibited the wingless female Hymenopteron, of which he had recently sent a sketch and brief account to the Society (see Proc. Ent. Soc., July 7th, 1880, p. xxiv), and which, from all the circumstances attending its discovery near Cape Town by Mr. C. A. Fairbridge, he had strong grounds for regarding as the female of the well-known *Dorylus helvolus*, Linn. He also showed a second specimen of the same female, presented to the South-African Museum by M. C. L. Péringuey, which was stated to have been found near Cape Town on the surface of the ground; whereas Mr. Fairbridge's example had been taken at a depth of about eighteen inches at the bottom of the nest of a small red ant, believed to belong to the genus *Anomma*, of which Mr. Trimen exhibited three workers found attached to the large female. The latter seemed clearly referable to Gerstaecker's genus *Dichthodia* (Stett. Entom. Zeit., xxiv., p. 76 ff, t. I.,

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fig. 2), which that author regarded as almost certainly the female of *Dorylus*.

Mr. Trimen also exhibited six cases fabricated by a South-African Lepidopterous larva, of which the outer covering consisted, not of pieces of grass, twigs, or other vegetable substances, but of particles of sand and fragments of stone. The very peculiar aspect of these cases was due to the fact that along each side was attached a series of much larger fragments of stone, roughly triangular in shape, and regularly arranged in a single row, with the longest point outwards; the effect of this arrangement being to give the case the general appearance of a Myriapod, and indeed a not very remote resemblance to *Peripatus*. These cases (in two instances containing the living larvæ) were found in the dry elevated "Karroo" country of the Cape Colony, in the districts of Beaufort and Clanwilliam, and were presented to the South-African Museum by Mr. Thomas Bain and Mr. J. R. Maquard respectively. Mr. Bain designated the larva as a "geologist in miniature," but wrote that its local name among the Boers (who regarded it as highly venomous!) was "Zand-Beestje." Mr. Trimen was unable to rear the larva, owing to ignorance of its food-plant; but, from its appearance when out of its case, he thought that it would in all probability have furnished a large moth of the family *Psychidæ*.

Papers read.

Sir Sidney Saunders read a paper "On the habits and affinities of the Hymenopterous Genus *Scleroderma*, with descriptions of new species."

Mr. Edward Saunders read a paper entitled "A Synopsis of British *Heterogyna* and fossorial *Hymenoptera*."

Prof. Westwood read a paper containing descriptions of new species of exotic *Diptera*, with a supplement containing descriptions of species formerly published by the author in inaccessible periodicals.

New Part of 'Transactions.'

Part III. of the 'Transactions' for 1880, published in October, was on the table.

December 1, 1880.

Sir John Lubbock, Bart., M.P., F.R.S., President, in the chair.

The minutes of the previous meeting were read and approved.

Donations to the Library were announced, and thanks voted to the respective donors.

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The President announced the names of the Members proposed as Officers and Council for 1881, and nominated the Auditors for the accounts of the present year.

Exhibitions.

Mr. F. P. Pascoe exhibited a large series of *Arescus histrio*, collected in Peru by Mr. Buckley, and interesting as showing the extreme variability of the markings on the elytra of this species.

The Rev. H. S. Gorham remarked that he had also observed this great variability, and that he possessed one specimen in which the markings were unsymmetrical on the two elytra. He stated that although the markings were so variable, the colour of the antennæ appeared to be always constant.

Mr. C. O. Waterhouse had also seen a specimen marked unsymmetrically, and had likewise observed the constancy in the colour of the antennæ.

Mr. T. R. Billups exhibited four species of *Pezomachus* new to Britain, viz., *P. Mülleri*, *P. juvenilis*, *P. intermedius*, and *P. incertus*. He also exhibited twenty species of Coleoptera found in a small parcel of corn-refuse from Mr. Fitch's granaries at Maldon, viz., *Calandra granaria*, Linn., and *C. oryzæ*, Linn.; *Trogosita mauritanica*, Linn.; *Læmophlæus ferrugineus*, Steph., and *L. pusillus*, Schön. (rare); *Silvanus surinamensis*, Linn.; *Monotoma quadrifoveolata*, Aube (rare); *Byphæa fumata*, Linn.; *Ptinus fur*, Linn.; *Niptus hololeucus*, Fald.; *Gibbium scotias*, Fab.; *Rhizopertha pusilla*, Fab.; *Alphitophagus 4-pustulatus*, Steph.; *Tribolium ferrugineum*, Fab., and *T. confusum*, Duval; *Latheticus oryzæ*, C. O. Waterhouse (a new species); *Hypophlæus depressus*, Fab.; *Alphitobius piceus*, Oliv.; *Tenebrio molitor*, Linn., and *T. obscurus*, Fab.

The President exhibited two specimens in alcohol of a species of *Phasmidæ* forwarded by a correspondent in St. Vincent.

Mr. W. D. Cansdale exhibited a specimen of *Tischeria gaunacella*, a species of *Tineina*, recently added to the British list, bred from *Prunus spinosa* in May, 1878; he also exhibited a remarkable variety of *Cidaria russata*.

Papers read.

Mr. John Scott communicated a paper "On a Collection of Hemiptera from Japan."

Mr. C. O. Waterhouse read a paper entitled "Description of a new species of the anomalous genus *Polyctenes*," and exhibited a diagram illustrating the structure of this insect.

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ANNUAL MEETING,

January 19, 1881.

Sir JOHN LUBBOCK, Bart., M.P., F.R.S., &c., President, in the chair.

Mr. J. W. Dunning, one of the Auditors, read an abstract of the Treasurer's Accounts for 1880, showing a balance of about £57 in favour of the Society.

Mr. F. P. Pascoe proposed, and Mr. E. A. Fitch seconded, that the abstract of the Treasurer's Accounts just read should be accepted. This was put to the meeting and carried unanimously.

The Secretary then read the following:—

REPORT OF THE COUNCIL FOR 1881.

The Council, in compliance with the Bye-Laws, begs to present the following Report:—

During the year 1880 the Society has lost three Members by death and seven by resignation, while eighteen new Members and Subscribers have been elected, thus showing a total increase of eight. The deaths that we have to record are those of Prof. Edward Grube and Mr. Andrew Swanzy, and at the end of last month our Society lost one of its ten Honorary Members, in the person of the well-known Lepidopterist, M. Achille Guenée, of Chateaudun. The Council will, at an early meeting, propose the name of some other gentleman to fill the vacancy thus caused.

With reference to our financial position, the Council has much pleasure in pointing to a balance of about £57 in favour of the Society, as shown by the following abstract of the Treasurer's accounts:—

RECEIPTS.		PAYMENTS.	
Balance in hand	£3	Rent, Office, and Meeting Expenses	£116
Contributions of Members	230	Publications	181
Life-compositions	31	Library	30
Sale of Publications	99	Investment in Consols	16
Interest on Consols	5		
Donations	32		
	£400		£343

This unusually large balance is attributable to the fact that our publishing expenses have not been as large as usual, while, on the other

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hand, two life-compositions have been paid, and the large sum of £99 has been realized by the sale of our publications.

The 'Transactions' for 1880 (exclusive of the 'Proceedings') form a volume of 320 pages, containing eighteen papers, illustrated by nine plates, of which five are coloured. The thanks of the Society are due to the Rev. H. S. Gorham, who defrayed a part of the cost of Plate I., and to Messrs. Godman and Salvin for their presentation of Plates III. and IV. Four wood-cuts have appeared in our 'Proceedings,' and the Council is of opinion that the custom of figuring remarkable varieties of insects that may be exhibited at our meetings cannot but tend to increase the value of this part of our publications, and to add to the interest of such exhibitions.

The Council have under consideration a proposal to make an alteration with respect to the distribution of our 'Transactions,' and as this change, if adopted, would involve a modification of one of our Bye-Laws, a special meeting must in that case be called. It is proposed to place our town and country Members on the same footing, and to give the 'Transactions' to all the Members of, and Subscribers to, the Society, without any further payment beyond their ordinary annual subscription. It is estimated that while by the adoption of this plan the Society would only incur, in the first instance, a loss of about £15 per annum, in all probability an increased number of new Members would be induced to join us if such an additional advantage were offered.

The Library continues to grow by the addition of the usual periodicals, and of many valuable works acquired by donation, purchase, and exchange. Among these acquisitions may be mentioned Lucas's 'Exploration de l'Algérie (Annulosa),' three vols. and atlas; Piaget's 'Monographie des Pédiculines'; Herbst's 'Versuch einer Naturgeschichte der Krabben und Krebse,' &c. The Society is indebted to the Trustees of the British Museum for Butler's 'Lepidoptera Heterocera,' for Lord Walsingham's 'American Tortricidæ,' and for C. O. Waterhouse's 'Lycidæ'; to the Royal Society for the completion of their 'Catalogue of Scientific Papers,' and to the Ceylon Government for Part I. of Moore's 'Lepidoptera of Ceylon'; whilst many other valuable donations have been acknowledged at the ordinary meetings. Increasing use is made of the books, and the Librarian reports that during the past year 100 more volumes have been in circulation than during 1879.

The attendance list shows that the twelve meetings held during the past year have on the whole been well supported, and the numerous exhibitions and discussions recorded in our 'Proceedings' will show that their interest has been well maintained.

11, Chandos Street, Cavendish Square, London, W.
January 19, 1881.

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The President proposed that the above report should be adopted. The motion was seconded by Mr. W. F. Kirby, and carried unanimously.

The President then nominated Mr. V. R. Perkins and Mr. M. J. Walhouse as Scrutineers; and at the termination of the ballot the following Members of Council were declared duly elected:—William Cole; William L. Distant; F. Du Cane Godman, F.L.S.; Ferdinand Grut, F.L.S.; Sir John Lubbock, Bart., M.P., &c.; Raphael Meldola, F.R.A.S.; Osbert Salvin, M.A., F.R.S.; Edward Saunders, F.L.S.; H. T. Stainton, F.R.S.; E. A. Fitch, F.L.S.; W. F. Kirby, F.L.S.; F. P. Pascoe, F.L.S.; Roland Trimen, F.L.S.

The following officers were then declared to be duly elected:—*President*, H. T. Stainton, F.R.S.; *Treasurer*, E. Saunders; *Librarian*, F. Grut; *Secretaries*, E. A. Fitch and W. F. Kirby.

An Address was then delivered by the President, at the conclusion of which Mr. F. P. Pascoe moved a vote of thanks to Sir John Lubbock for his services during his occupancy of the Presidential Chair, and proposed that his Address should be printed. The proposal was seconded by Mr. Fitch and carried by acclamation.

Sir John Lubbock having replied, Mr. J. W. Dunning proposed a vote of thanks to the Treasurer, Secretaries, and Librarian. Mr. M. J. Walhouse seconded the motion, which was carried unanimously.

Messrs. Grut, Meldola, and Distant made some remarks in reply.

Mr. Distant stated, in conclusion, that he was sure the members would hear with regret that a portion of Epping Forest was threatened with destruction. The subject had been brought under the notice of the Council by Mr. Cole; and he had been requested to state that a resolution had been passed expressing the wish that Epping Forest should be kept, in accordance with the Act of Parliament, as far as possible, in its natural condition. The announcement was received with approbation.

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ABSTRACT OF RECEIPTS AND PAYMENTS.

Receipts.				Payments.			
1880	£	s.	d.	1880	£	s.	d.
To Balance at 1 Jan. 1880 -	2	11	10	By Rent, Salary of Sub-Librarian, and Office Expenses - -	115	13	5
Subscriptions, as per list -	162	11	0	Printing - - - -	121	15	11
Entrance Fees - -	27	6	0	Colouring Plates, &c. -	59	2	7
Arrears - - - -	39	18	0	Books, Binding, &c. -	29	12	9
Compositions - - -	31	10	0	Investment - - -	15	15	0
Donations - - -	31	19	6				
'Transactions,' sale of -	99	4	6				
Consols, interest on £313 4s. 8d.	4	12	0	Balance 31st Dec. 1880 -	57	13	2
	£399	12	10		£399	12	10

ASSETS.

	£	s.	d.
Balance - - - - - - - - - - -	57	13	2
Subscriptions due, but not paid, considered good (say)	8	8	0
Consols, £313 4s. 8d. - - - - - (cost)	293	4	0
	£359	5	2

EDWARD SAUNDERS, *Treasurer.*

Audited and found correct, { J. W. Dunning. Chas. O. Waterhouse. J. Jenner Weir.

12th January, 1881.

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THE PRESIDENT'S ADDRESS.

I MUST commence, Gentlemen, by tendering to you the expression of my warm gratitude for your forbearance and kindness during the last fifteen months. When I found that it would be impossible for me to attend your meetings for some time, I placed my resignation in the hands of the Council, who, however, thought it better that I should continue in office until the end of the usual term. I have to thank them for their careful attention to the affairs of the Society; and especially to the Secretaries and Vice-Presidents, and to Mr. Dunning, who was good enough to deliver the address last year.

We may, I think, fairly congratulate ourselves that the science of Entomology continues to make rapid progress. The number of species recorded, and our knowledge of their habits, anatomy, and affinities, are continually increasing.

The energy of Entomologists is so great, the subject is so interesting and vast, and consequently the extent of Entomological literature is so enormous, that it is of course impossible for your President to do more than refer to a very small proportion of the numerous works and memoirs which have appeared during his term of office.

Our own Transactions contain a number of valuable memoirs. The list is as follows :—

PART I.—"Materials for a revision of the *Lampyridæ*," by Rev. H. S. Gorham. "On some Coleoptera from the Hawaiian Island," by Dr. Sharp. "On synonyms of Heterocerous Lepidoptera," by A. G. Butler. "Descriptions of *Cetoniidæ* and *Cerambycidæ* from Madagascar," by C. O. Waterhouse.

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Part II.—"On the structure of the *Lampyridæ*, with reference to their phosphorescence," by Rev. H. S. Gorham. "Notes on the coloration and development of Insects," by Peter Cameron. "On *Cetonia aurata* and *Protaetia Bensoni*," by Prof. Westwood. "Materials for a revision of the *Lampyridæ*," by Rev. H. S. Gorham. "On two gynandromorphous specimens of *Cirrochroa Aoris*, &c.," by Prof. Westwood.

Part III.—"A list of Diurnal Lepidoptera collected in the Sierra Nevada of Santa Marta, Colombia, and its vicinity," by Messrs. Godman and Salvin. "On the genus *Colias*," by H. J. Elwes. "Notes on exotic Rhynchota, with descriptions of new species," by W. L. Distant.

Part IV.—"On the Asiatic Lepidoptera referred to the genus *Mycalesis*; with descriptions of new genera and species," by F. Moore. "On the *Buprestidæ* from Madagascar," by C. O. Waterhouse. "Observations upon certain species of the Lepidopterous genus *Terias*, with descriptions of hitherto unnamed forms from Japan," by Arthur G. Butler. "Synopsis of British Heterogyna and Fossorial Hymenoptera," by Edward Saunders. "On a collection of Hemiptera from Japan," by John Scott. "Description of a new species of the anomalous genus *Polyctenes*," by C. O. Waterhouse.

On the present occasion, however, I will not dwell on the researches of our own members.

Quitting then our own contribution to Entomological science, we are indebted to Dr. Grenacher for a very interesting and important work* on the vision of insects, portions of which have already appeared in preliminary communications. He points out the curious fact that the different simple eyes in the same spider differ in some species considerably in their structure.

He divides the compound eyes of insects into three types:—

Acone eyes, in which the crystal cone is not present, but is represented throughout life by distinct cells;

Pseudocone eyes, in which there is a special conical and transparent medium; and, lastly,

Eucone eyes, with true crystalline cones.

* Untersuchungen uber der Sehorgan der Arthropoden.

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As regards the compound eye of insects, Dr. Grenacher adopts the mosaic theory of Müller,—that is to say, he does not consider that each facet produces an image, as is the case in our eyes, but corresponds to a single point in the field of view.

In certain species, between the posterior end of the crystalline cone and the front of the perceptive apparatus, is a narrow constriction, which is sometimes considerably produced, so that the formation of an image would seem to be physically impossible.

Again, the formation of an image would require a power of accommodation for different distances, but he could find no trace that any such power exists.

Another objection is the extreme difficulty which would exist of combining so many different images into one idea, though it must be admitted that at first sight this difficulty (though to a minor degree) exists even in the case of simple eyes, the number of which varies considerably. Spiders have six to eight; some aquatic larvæ twelve; while the *Oniscoideæ*, assuming that these eyes are aggregates of simple eyes, as Müller supposed, have as many as twenty to forty. These, however, take in different parts of the field of vision.

The principal reasons which have led Dr. Grenacher to decide in favour of Müller's theory of mosaic vision are as follows:— In certain cases there is no lens, and consequently there can be no image; in some it would seem that the image would be formed completely behind the eye, while in others again it would be too much in front. Another difficulty is that any true projection of an image would in certain species be precluded by the presence of impenetrable pigment, which only leaves a minute central passage for the light-rays. In all cases moreover, without any exception, even the sharpest image would be useless, from the absence of a suitably receptive surface; since both the number and mode of combination of the elements composing that surface seem to preclude it from receiving more than a single impression. He concludes, therefore, that the image theory must be definitely abandoned.

If these views are correct, we come to the interesting result that while the image produced on the retina of the ocellus must of course be reversed as in our own eyes; in the compound eyes, on the contrary, the vision must be direct. That the same animal should see some things directly, and others reversed; and

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yet obtain definite conceptions of the outer world, would certainly be very remarkable.

With this fundamental difference between the ocellus and the compound eye, it does not seem possible that either the ocellus should be derived from the compound eye, or the compound eye from the ocellus. On the contrary, both seem to point back to a less developed ancestral type. Starting from such an origin, an increase of the separate elements and an improvement of the lens would lead to the ocellus, while an increase of the number of eyes would bring us to the compound eye.

On the other hand, it must be admitted that there are reasons for considering the different kinds of eyes to be of perfectly distinct origin. The eye of *Limulus*, according to Grenacher, is formed on a plan quite unlike that of other Crustacea. Again, the development of the eye in *Musca*, to judge from Weismann's observations, is very dissimilar from that of other insects. The varied position of the eye in different groups, as, for instance, in *Peeten*, *Spondylus*, *Euphansia*, *Onchidium*, &c., point to the same conclusion.

The old opinion was that the compound eyes were intended for distant, the ocelli for near, vision, but Claparède long ago attempted to show that the reverse was the case.

Mr. Lowne, who has contributed to the 'Philosophical Transactions' for 1878 an interesting memoir on the "Eyes of Insects," agrees with Grenacher in leaning towards Müller's view, which, indeed, he considers to be the only theory yet advanced capable of explaining the phenomenon, "when we bear in mind the relation of the recipient structures of the compound eye to the nerve elements beneath them." The ocelli, on the other hand, he regards as incapable of producing "anything worthy the name of an image," and he suspects that their function "is the perception of the intensity in the direction of light rather than vision."

In opposition to Müller's statement that no portion of the compound eye in any of the insects he examined corresponded in the direction of the axis of the facets with the eye of the opposite side, Mr. Lowne states that "in most insects the field of vision in the two eyes has a common portion in the peripheral region in the vicinity of the mouth; in this region the radius of curvature of the cornea is very short. It is, therefore, only adapted for the

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acute vision of very near objects. It is chiefly developed in predaceous insects. It probably serves the insect in judging of the distance of objects from the mouth."

Mr. Lowne describes specially the eyes of *Syrphus*, *Musca*, *Eristalis*, *Tipula*, *Vespa*, *Formica*, *Agrion*, *Acridium*, *Vanessa*, *Sphinx*, and *Noctua*. He finds the eye of *Sphinx* to be intermediate between those of the nocturnal and diurnal Lepidoptera, while the highest development of the "aggregate eye" occurs in the so-called compound eyes of the Nematocerous Diptera and the Hymenoptera. He considers the eye of the Daddy Long-legs (*Tipula*) to be intermediate in structure between a true compound eye and a collection of ocelli—a view, however, which seems to present considerable difficulties. As regards the power of vision possessed by the compound eyes, he believes that a dragon-fly or a wasp sees an object at a distance of twenty feet "in the same detail that a man would perceive it if it were seen at a distance of one hundred and sixty feet." On this point some observations of M. Fabre's are of much interest. Some years ago I tried myself the experiment of taking bees to some distance from home, and then letting them go. They rose in the air, just as a pigeon does under similar circumstances, and ere long returned home. I was, however, prevented from following up these observations. M. Fabre has now made similar experiments, and finds that if bees are taken as far as four kilometres from home, they will still find their way back. It would be very interesting to make these experiments for greater distances, but the facts already ascertained surely indicate considerable powers of vision.

As regards the structure of ocelli, Graber* differs materially from Grenacher. He observes that, according to the latter, the whole complex structure from the termination of the optic nerve to the hinder surface of the cornea forms one cell. Graber, on the other hand, considers that it is composed of two. He observes that Grenacher considers the nucleus of his single cell to be sometimes pre-bacillar, sometimes post-bacillar. These, however, Graber regards as really the nuclei of two different series of cells. He considers that the ocellus of the scorpion offers in some respects an interesting intermediate form between the simple and compound eye. In fact, his account of their delicate and

* Ar. f. Mic. Anat., 1880, xvii., p. 58.

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complex organs differs fundamentally from that given by Grenacher. Grenacher, in a subsequent memoir,* defends his own views, and denies the accuracy of Graber's observations. He points out that, while *Scolopendra* has only four eyes, the number increases in *Julus*, *Lithobius*, and *Glomeris*; and that in *Scutigera* it is so great (amounting to several hundred), and the facets are so close to one another, that the eye has all the appearance of the compound eye of a true insect; and if each cornea throws an image on a retina, we have the difficulties which Müller has pointed out in the case of insects.

Moreover, though the ocellus of a spider at first sight closely resembles the eye of a *Scolopendra*, the internal structure is, according to Grenacher, altogether different. In the ocellus of a spider or an insect we find, at a greater or less distance behind the lens, a retina consisting of a receptive surface, extended concentrically with that of the lens, and consisting of a number of more or less rod-like perceptive elements so arranged that their light could fall on their ends.

On the contrary, in the eyes of Myriapods there is, he says, either a single receptive element behind the cornea, or where there are many they are arranged with their longer axes perpendicular to the direction of the light; so that any separate perception of the rays of light coming from different points seems to be an impossibility. In the eye of *Lithobius*, behind the biconvex lens, he states that the cells, lining what I may call the tube of each separate eye, terminate in hairs, between the free ends of which is left a narrow passage down which the light must pass to reach the end of the optic nerve. Such a structure, certainly very remarkable, seems entirely to preclude the possibility of the formation of a true image. Altogether the account given by Grenacher, both as to the mode of action of the eyes of Myriapods and as to their internal structure, differs entirely from that of Graber.

Sograff, also, has recently given a description of the eye of *Lithobius*, but as his memoir is in Russian I am unfortunately unable to state his views.

Mr. Hammond has published, in the 'Linnean Journal,' an interesting paper on the structure of the thorax of the Blow-fly. He concludes that the thorax of Diptera is almost exclusively mesothoracic. He also expresses the opinion that where a

* Ar. f. Mic. Anat., 1880, xvii., p. 415.

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spiracle lies between two segments it is "always the property of the posterior surface of the segment in front of it."

Mr. Balfour, in his 'Comparative Embryology,' has given an excellent *résumé* of our knowledge of the Embryology of Insects. He regards Moseley's observations of the tracheal system of *Peripatus* as fatal to the view that insects can have sprung directly from aquatic ancestors not provided with trachea, and considers that these characteristic organs are modifications of cutaneous glands. The problematical "imaginal disks" of Weismann he regards as derivatives of the embryonic epiblast, like the similar invaginations of the skin in many larval Nemertines. He considers that the Thysanura and Collembola, while "not belonging to the true stock of the ancestors of insects," are "degenerated descendants of this stock; much as *Amphioxus* and the Ascidians are degenerate relatives of the ancestral stock of Vertebrates." He considers that the closed tracheal system of larvæ with tracheal gills is undoubtedly of a secondary character, and that this tells strongly against the view that the wings are modified tracheal gills.

We are also indebted to Mr. Balfour for a short but interesting paper on the Embryology of Spiders.* The species which he studied is *Agelena labyrinthica*. His observations have satisfied him that in their development the Arachnida are much more closely related to the other Tracheata than to the Crustacea; but I must confess that I doubt whether we have yet sufficient data to justify us in concluding that the points of difference on which he dwells will be found to hold good generally. There has been much difference of opinion as to the homology of the *Cheliceræ*, and some eminent authorities have regarded them as corresponding to the antennæ of insects. Mr. Balfour, however, considers that his observations prove them to be postoral, and equivalent to either the mandibles or the first maxillæ of other Tracheata. As regards the yolk-cells, he finds himself in close harmony with Dohrn, Bobretsky and Graber; but he states that the first formed mesoblastic plate does not give rise to the whole of the mesoblast, but that during the whole embryonic life the mesoblast continues to receive accessions from the cells of the yolk.

M. Fabre has published a charming volume of 'Souvenirs Entomologiques.' He has continued and added to the very

* 'Quarterly Journal of Microscopical Science,' 1880, p. 167.

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interesting observations on the solitary wasps which he published some years ago. He then described the singular state of paralysis into which they throw their victims, which if killed would decay, and if buried alive would in their struggles almost infallibly destroy the egg or young larva of the wasp. The wasp, however, stings them in such a manner as to pierce the ganglia, and thus, without killing them, almost deprives them of all power of movement. One species of *Sphex*, which preys on a large grasshopper (*Ephippigera*), obtains the same result in a different manner. After having almost paralysed her victim in the usual manner, she throws it on its back, bends the head so as to extend the articulation of the neck, and then, seizing the intersegmental membrane with her jaws, crushes the subœsophagal ganglion. Truly a marvellous instinct. M. Fabre found that, after this treatment, the victims retain some power of digestion, and he was able considerably to prolong their life by feeding them with syrup.

Side by side with these wonderful instincts, M. Fabre records almost equally surprising evidence of stupidity. The very same species of *Sphex*, for instance, is, it seems, accustomed to drag the *Ephippigera* by one antenna; and M. Fabre found that if the antennæ be cut off close to the head, the *Sphex*, after trying in vain to get a grip, gives the matter up as a bad job, and leaves her victim in despair, without ever thinking of dragging it by one of its legs. Again, when a *Sphex* had provisioned her cell, laid her egg, and was about to close it up, M. Fabre drove her away, and took out the *Ephippigera* and the egg. He then allowed the *Sphex* to return; she went down into the empty cell, and though she must have known that the grasshopper and the egg were no longer there, yet she proceeded calmly to stop up the orifice just as if nothing had happened.

The genus *Sphex* paralyzes its victims and provisions its cell once for all. *Bembex*, on the contrary, kills the insects on which its young are to feed, and, perhaps on this account, brings its young fresh food (mainly flies) from time to time. But while the *Bembex* thus preys on some flies, there are others which avenge their order. The genus *Miltogramma* lays its eggs in the cells of the *Bembex;* and though there seems no reason why the *Bembex*, which is by far the stronger insect, should tolerate this intrusion, which, moreover, she shows unmistakably

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to be most unpalatable, she never makes any attack on her enemy. Nay, when the young of the *Miltogramma* are hatched, so far from killing or removing them, this entomological cuckoo actually feeds them until they reach maturity. Nevertheless it seems contrary to etiquette for the fly to enter the cell of the *Bembex;* she watches the opportunity when the latter is in the cell and is dragging down the victim. Then is the *Miltogramma's* opportunity; she pounces on the victim, and almost instantaneously lays on it two or three eggs, which are then transferred, with the insect on which they are to feed, to the cell.

It is remarkable how the *Bembex* remembers (if one may use such a word) the entrance to her cell, covered as it is with sand, exactly to our eyes like that all round. Yet she never makes a mistake or loses her way. On the other hand, M. Fabre found that if he removed the surface of the earth and the passage, exposing the cell and the larva, the *Bembex* was quite at a loss, and did not even recognise her own offspring. It seems as if she knew the door, the nursery, and the passage, but not her child.

Another ingenious experiment of M. Fabre's was made with *Chalicodoma.* This genus is enclosed in an earthen cell, through which at maturity the young insect eats its way. M. Fabre found that if he pasted a piece of paper round the cell the insect had no difficulty in eating through it; but if he enclosed the cell in a paper case, so that there was a space even of only a few lines between the cell and the paper, in that case the paper formed an effectual prison. The instinct of the insect taught it to bite through one enclosure, but it had not wit enough to do so a second time.

Yet it appears that the instincts of these animals are not absolutely unalterable. *Sphex flavipennis,* which provisions its nest with small grasshoppers, when it returns to the cell leaves the grasshopper outside, and goes down for a moment to see that all is right. During her absence M. Fabre moved the grasshopper a little. Out came the *Sphex,* soon found her victim, dragged it to the mouth of the cell, and though she had just been down left her prey as usual, and went alone into the cell. Again M. Fabre moved the grasshopper, the wasp found it, dragged it to the cell, and left it as before. Again and again M. Fabre moved the grasshopper, but every time the *Sphex* did exactly the same thing, until M. Fabre was tired out. All the

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insects of this colony had the same curious habit; but on trying the same experiment with a *Sphex* of the following year, after two or three disappointments the *Sphex* learned wisdom by experience, and carried the grasshopper directly down into the cell.

M. Fabre has also published* a short but interesting memoir on the habits of *Halictus cylindricus* and *H. sexcinctus*. In this genus we find the first step, as it were, to the well-organised association of Bees, Wasps and Ants. Each female *Halictus* prepares, as usual without any assistance from the male, her own cell, and feeds her own young; but, on the other hand, the separate cells open into a common passage which is the joint possession of several bees. These species are very early risers, and rest during the greater part of the day, excavating, it would appear, their galleries for the most part during the night, and collecting pollen in the early morning only. They are double-brooded. The September brood contains rather more males than females—about four to three. The males soon perish, but the females remain quiet in their cells till the spring, when they emerge, lay their eggs, provision their cells, and then die in their turn. These eggs, however, M. Fabre assures us, produce no males, so that the summer brood consists of females only, affording an interesting and remarkable instance of Parthenogenesis. It is possible that the same rule may be found to occur among other double-brooded insects.

Mr. Goss has given us a very interesting summary of the present state of our knowledge on "The Geological Antiquity of Insects." The Neuroptera and Orthoptera are the oldest orders; then come the Coleoptera and Hemiptera, followed by the Diptera, Hymenoptera, and Lepidoptera. As regards the latter, there is indeed much difference of opinion. M. Coemans discovered in 1875, at Sars-Longchamps, in the Belgian Coal-measures, an insect which Dr. Breyer believed to be Lepidopterous; in which view he is supported by M. Preudhomme and Mr. Wallace. Mr. M'Lachlan, on the contrary, regards it as Neuropterous. Mr. Butler has also described an Oolitic insect under the name of *Palæontina oolitica*, which he supposed to be Lepidopterous; Mr. Scudder, however, with whom Mr. Goss is disposed to agree, regards it as Homopterous.

* Ann. Sci. Nat., 1880, p. 8.

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Mr. Scudder also, in several memoirs published by the Boston Society of Natural History, has added considerably to our knowledge of fossil insects. He describes several new species of insects belonging to the Devonian period, all of which are allied, or belong, to the Neuroptera, using the word in the widest sense. The general conclusions to which he arrives are that—

There is nothing in the structure of these earliest known insects to interfere with the former conclusions that the general type of wing-structure has remained unaltered from the earliest times.

The Devonian insects were all lower Heterometabola. As wings are the only part preserved, we cannot tell from the remains preserved whether they belong to sucking or to biting insects.

They bear little special relation to carboniferous forms, having a distinct facies of their own.

The Devonian insects were of great size, had membranous wings, and were probably aquatic in early life.

They show a remarkable variety of structure, indicating an abundance of insect life at that epoch, and differ remarkably from all other known types, ancient and modern; some of them appearing to be even more complicated than their nearest living allies.

We appear, therefore, he says, "to be no nearer the beginning of things in the Devonian epoch than in the Carboniferous, so far as either greater unity or simplicity of structure is concerned"; and these earlier forms cannot in his opinion be used to any better advantage than the carboniferous types in support of any special theory of the origin of insects. Still Mr. Scudder expresses the conviction that some original and still earlier "unknown comprehensive types did exist, and should be sought."

Mr. Ryder has described, in the 'American Naturalist,' an interesting genus allied to the very curious little centipede, *Pauropus*. It possesses the same number of legs, but, according to Mr. Ryder, only six segments, two pairs of legs being attached to the second, third, fourth, and fifth segments, not counting the head. I should be disposed to consider that, as he himself suspected, the head really consists of two segments, and that the

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terminal segment is also really double. In that case, the number of segments will be the same as in *Pauropus*. The wider form, the position of the head, and the peculiar tubercles and spines on the skin, seem to justify the establishment of a new genus; and Mr. Ryder even proposes for his little creature a new family.

Dr. Haller has described (Ar. f. Natur., p. 369) a species of mite, *Trombidium andiens*, in which he considers that the eye of other *Trombidiums* has been modified into an organ for hearing. The discovery of an undoubted ear in a *Trombidium* would itself be a point of considerable interest, but such a change of function as that an organ of vision should change into an ear is certainly most remarkable; and we should require clear proof that the organs are really homologous, and that the one is truly an ear. Dr. Haller describes, in the present case, two groups of bodies which he considers to be otolithes, but has not been able to detect any auditory hairs. He figures the organ in question on a small scale, but, considering the interest attached to the observation, it is to be hoped that he will give a more detailed description and enlarged illustrations.

Dr. Hauser has published* an interesting paper on the olfactory organs of insects. He adopts the view of Lefebre and Erichson, which I have also attempted to demonstrate,† that the antennæ of insects are organs of smell. There can, I think, be no doubt that they do serve this function, but it is not incompatible that they should in other cases serve as organs of hearing. Dr. Hauser describes in detail the minute pits which have been already observed and figured by Hicks‡ and others, and shows that each contains a central cone, which terminates in a rod, and which, in some cases, as for instance in the wasp, is itself obviously very complicated, and contains one or more series of secondary rods. He lays much stress on the fact that insects which depend on smell have their organs specially developed.

Hermann Müller continues his interesting and charming series of papers in 'Kosmos,' which, if their relation is primarily to the Botanist, have much bearing on Entomology also. He has dwelt recently on the effect which the preponderance of Lepidoptera over bees in the higher regions has had in modifying the

* Zeit. f. Wiss. Zool., 1880.

† Linnean Journal, vol. xii.

‡ Trans. of Linn. Soc.

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flowers of the Upper Alps. One curious point I may refer to, namely, that proterogynous flowers frequently—as, for instance, among the Saxifrages—increase in size during their period of bloom, so as to be larger in the male than in the earlier female condition; while proterandrous flowers never do so. The reason of this obviously is the advantage in the male flowers being first visited.* He observes that butterflies prefer red and blue flowers, especially the latter, to those which are yellow or white. It is interesting that the same love felt by butterflies for these colours, which, by means of sexual selection, has probably tended to their frequency and beauty on the insects themselves, should in another manner have led to their frequent presence and brilliant beauty on the flowers which they love. With reference to this point he gives the following curious facts:—Out of every hundred visits of insects observed in flowers which are white, whitish yellow, or yellow, on the one hand, or, on the other, red, violet, or blue, there were of—

Diptera with a short proboscis . . .	85·8	14·2
Coleoptera	76·8	23·2
Diptera with a long proboscis . . .	67·9	30·3
Hymenoptera, excluding Bees . . .	81·2	18·8
Bees with a short proboscis	63·8	36·2
Lepidoptera	43·8	56·1
Hive Bees	36·6	63·3

While, in the case of the parasitical Humble Bees, the numbers are respectively 22·2 and 77·8, which he accounts for on the hypothesis that these bees, having no need to work for their young, are more free to follow their own tastes.

We owe to M. de Saussure a short but important memoir on the genus *Hemimerus*, an insect which has much the appearance of a young cockroach, or mole-cricket, with which group it has in fact hitherto been classed. M. de Saussure states, however, that the mouth possesses an extra pair of appendages, constituting a third pair of maxillæ, and resembling a second lower lip. This remarkable character would separate it, not only from the Orthoptera, but from all other insects, and in M. de Saussure's opinion necessitates the creation of a new section of

* Kosmos, 1880, p. 280.

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Arthropods, or rather, it seems to me, a reconstruction of our views as to the homologies of the organs of insects with those of other Articulata. One would be indeed tempted to ask whether this so-called extra pair of appendages may not be the representative of the ligula, which in some *Orthoptera*, as, for instance, *Anostostoma alatum*, where it has been recently figured by Mr. Butler,* bears pseudopalpi apparently consisting of several segments. I may observe that I have myself suggested the existence of a second pair of mouth appendages in the Collembola, but in that group the structure of the mouth is very intricate, and I did not, therefore, consider it would be safe to base any general conclusions on the observation. As regards *Hemimerus*, M. de Saussure's observations are so definite, and his authority so great, that I feel great hesitation in questioning any statement made by him. At the same time I must say that Mr. Waterhouse and I, after examining a specimen in the British Museum, which apparently belongs to the same species, have been quite unable to satisfy ourselves as to the existence of a second pair of jaws.

In the October number of 'Kosmos,' Fitz Müller has called attention to an interesting species of gnat (*Paltostoma torrentium*), in which there are two distinct kinds of females. Among butterflies we have long known cases in which there are two kinds of females, differing in the colour and pattern, sometimes even in the form, of the wing. The social Neuroptera and Hymenoptera present us with other well known cases, and the Diptera may now be added to the list. In *Paltostoma* the two kinds of females differ in the eyes, mouth-parts, feet, and habits. The one sort resembles the females of other allied species, and is a blood-sucker; the other has simpler feet, smaller eyes, and mouth closely resembling that of the male. Müller thinks it feeds on honey.

Before sitting down there are one or two points with reference to the affairs of our Society on which I must say a few words. In the first place I must express my regret, which I am sure you all share, that we are about to lose the valuable services of our excellent Secretaries, Mr. Meldola and Mr. Distant. At the same time they have secured as successors two gentlemen who will, I doubt not, prove themselves most efficient.

* Proc. Zool. Soc., 1880, p. 158.

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The Council have under consideration whether the 'Transactions' of the Society's publications might not be given gratuitously to London as well as to country members. The question has been referred to in their Report.

The next point is with reference to the hour of meeting. I have already alluded to the subject from this chair, and I will therefore now only repeat that although of those who answered the circular of the Council a large majority expressed themselves in favour of meeting earlier, still the actual number of those supporting the change was so small compared to that of our members, that the late Council did not see their way to take any further action in the matter. It is, however, of course open to those gentlemen who advocate the change to bring the subject again before the Society.

In conclusion, Gentlemen, I will end as I began by offering you my thanks for your courtesy and support during my term of office. In resigning the Presidency I rejoice to think that I shall be succeeded by one of the very first of English Entomologists, my old and excellent friend, Mr. Stainton, under whose able guidance I cannot doubt that our Society will continue to prosper.

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OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1880.

I. *Materials for a revision of the* Lampyridæ. By the Rev. H. S. Gorham.

[Read December 5th, 1879, February 4th and March 3rd, 1880.]

In submitting the descriptions of hitherto uncharacterized beetles of the family of *Lampyridæ* to the Entomological Society, I will introduce the subject by a few general remarks which I venture to think will not be out of place.

The family in question form the second division of the great group *Malacodermata* of Latreille, or they may be properly regarded as a sub-family or group of secondary importance. For the purpose of this paper I shall treat them as a family, for though they certainly pass very gradually into the *Lycidæ* on one side, and the *Telephoridæ* on the other, yet a very little experience will enable the student at once to decide whether a species really belongs to the *Lampyridæ* or not. The resemblance to the former is rather apparent than real, a true case of mimicry, there being scarcely a pattern in the *Lycidæ* which is not repeated here. With regard to their affinity to the *Telephoridæ*, *Photuris*, which makes the nearest approach, is so very natural a genus, and retains so many peculiar characters of the *Lampyridæ*, including their luminosity, in so high a degree that the general characters,

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which I now proceed to give, will always separate them. Lacordaire thus defines these differences:—

Intermediate coxæ separated by an interval— I.—*Lycidæ*.

Intermediate coxæ close to each other—
Antennæ inserted close together .. II.—*Lampyridæ*.
Antennæ separated .. .. .. III.—*Telephoridæ*.

On this I will merely remark that as we study the general structure of *Photuris*, it will be found to recede further from the *Telephorides*, *e. g.*, in the development of the eyes, correlated with that of the production of light in the female, and in the structure of the abdomen, of which more hereafter.

I now go on to speak of the generic classification of these insects. If Motschulsky used the number of apparent light-giving segments in the abdomen, to the neglect of more important modifications in its structure, yet on a review of the more natural arrangement to which Lacordaire reduced his genera, or rather restored the family, we shall see a distinct relation between the development of the phosphorescent power, and many, if *not all*, the other modifications. Thus in the first section in which both males and females are equally provided with wings, and in which those remarkably beautiful flabellate antennæ are found, the light-giving parts are confined to one or two small points, and the eyes, especially those of the males, are not of extraordinary size. While in those genera which form the latter half of this section (*Lucidotides*), and are contained in the two following (*Lampyrides*, *Luciolides*), and in which the phosphorescence reaches its greatest development, the antennæ are reduced to simple filiform, often very short organs, and the eyes of the males are so enlarged as to resemble small seeds. In short, if I see the head of a Lampyrid, I can predict the greater or less phosphorescence of the ventral portion.

And beyond this I have found that the best generic characters lie in the structure of the last or last but one abdominal plates; these are cut out or lobed in a manner varying in each genus I have yet examined, sometimes alike in each sex, at others differently. These portions are apt to shrivel in such soft-bodied insects, enhancing the difficulty of examination in old specimens. I therefore must ask some indulgence for the merely partial description of these parts, and for the mere attempt at drawings of them which I have to offer.

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One word as to the so-called luminous portions. These parts are patches, or even whole ventral and sometimes dorsal plates, deprived of pigment and hence often white, and vitrified in a peculiar manner, to which I apply the word *eburated;* this occurs oftenest when the portion is small, and then it is generally also raised, and seems to bear some analogy to the eburated white marks and fasciæ, which I have noticed in the *elytra* of other *Coleoptera, e.g.*, in Longicorns and *Cleridæ*. Is it merely a fancy that these raised portions act as lenses for condensing and intensifying the light, and that in some of the other *Coleoptera* I have mentioned they permit the sun's rays to pass through the elytra and exercise some good effect on the body, while here they serve something like the bull's-eye of a lantern for the dispersal of the rays of light? The spots on the thorax of the luminous elaters of the genus *Pyrophorus* may serve to illustrate my meaning in the light-giving case; the lucid points on the elytra of a species of *Helota*, described by myself (*H. gemmata*), that of the light-transmitting case. I do not aspire to a revision of the *Lampyridæ* at present; the material in my hands is not sufficient for that: it consists of—1, my own collections, formed for a few years only, including that of Mr. Norris; 2, that of the Brussels Museum with Guérin's types obligingly entrusted to me by the Curators; 3, the collection sent and still coming from Mr. Champion, from Guatemala; 4, typical specimens from M. Chevrolat, and a few small collections for which I beg to thank the various lenders.

I content myself now with merely enumerating the species I have actually identified, and describing those which appear to be new, at the same time indicating where the specimens alluded to are now. The first portion which I lay before you to-night takes the *Lucidotides* as far as the end of *Lucidota*, or the genera with *pectinate* or at least dentate antennæ. Thirty species and one genus are described as new.

List of New Species.

Lamprocera tristior.
" præusta.
" picta.
" brevicollis.
Hyas bipunctata.
" rhomboidea.
" angularis (Chevr.).
Cladodes stellata.
Cladodes ventralis.
" nigricollis.
" plumosa.
Phænolis *genus novum*.
" laciniata.
" ustulata (Chevr.).
" ochracea.
Æthra despecta.

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Æthra concolor.
„ brunnipennis.
Vesta Saturnalis.
„ proxima.
„ basalis.
Lucidota proxima.
„ californica (Chevr.).
„ exstincta.
„ boliviana.
Lucidota silphoides.
„ bella.
„ rubricollis.
„ fulgurans.
„ apicicornis.
„ limbata.
„ tricolor (Chevr.).
„ quadriguttata.

LAMPROCERA, Castelnau.

L. Latreillei, Kirby, Tr. Linn. Soc. xii. 387. (Pl. XXI. fig. 4*a*.)

Brazil, ♂, ♀. All collections.

Lamprocera tristior, n. sp.

Sooty-black, thorax with the margin reflexed, which in one ♂ is very narrowly yellow, elytra with a narrow yellow vitta from the humeral callus for two-thirds their length. Luminous round spot on fifth ventral segment.

Long. lin. 9—10.

2 ♂ Brus. M., Brazil; 1 ♀ Gorh., Rio Grande.

Lamprocera præusta, n. sp.

Testacea, antennis, tibiis, tarsis, elytrorum apice episternis mesothoracis, abdominisque lateribus, et segmentis tribus apicalibus, fusco nigris.

Long. lin. 10; lat. lin. 5. ♀.

Of the form of *L. Latreillei*, and equal in size to small females of it. I have only seen one ♀ of this species, which is in my collection, from that of Norris.

Buenos Ayres.

Lamprocera Castelnaui, Kirsch., Berl. Zeit. 1865, p. 69.

Niger, thorace elytrisque brunneis, his apice late, illo disco nigris, thoracis angulis posterioribus punctatis, subfuscis.

Long. lin. 9—11; lat. 5—6.

Of the size and form of *blattina*, unlike any other species in the colouring, the luminous segment in the ♂ appears to be the seventh, in the ♀, although the segments are rufo-fuscous in their middle and at the sides any distinctly-luminous portion is not apparent. Antennæ widely flabellate in ♂, pectinate in ♀.

Nova Grenada, Gorh. ♂, ♀. B. M.

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Lamprocera abdominalis, Cast. Essai, 136. Lac. Gen. iv. p. 312.

Gorh. ♂. Brus. ♀.

The humeral callus and base of elytra round the scutellum are yellow.

Lamprocera picta, n. sp.

Nigro-fusca, thorace antice, elytrisque fascia latâ, marginem non attingente flavis.

Long. lin. 8—11; lat. 5—6.

Very nearly related to *abdominalis*, Cast., but the elytra usually are concolorous at the base (the scutellar spot and a very small basal streak external to the callus are present in one ♀ example), and the fuscous abdomen sufficiently distinguish this species. The arcuate sixth segment in the ♂, and two points on the seventh segment in the ♀ are luminous.

Nicaragua, Godman and Salvin. ♂, ♀. Brus. ♀ *var.*

Lamprocera brevicollis, n. sp.

Nigro-fuscus, thorace antice pallido, elytris fuscis angulis basalibus et maculâ magnâ communi post scutellum flavis.

Long. lin. 8; lat. 4. ♀.

Rather oblong, thorax very short, external angles rounded, a little longer than *Hyas denticornis*, but not so wide.

Buenos Ayres, Gorh. (e Norris).

Lamprocera flavoquadrata, Blanchard Voy. d'Orb. (Fig. 124.)

Bolivia, Brus. M. ♀.

Lamprocera blattina, Perty Del. An. Art., p. 26. (Pl. VI. fig. 1.)

Brazil, ♂, ♀.

Cayenne, Brus. M. ♀ *var.* Thorace antice tantum pallide binotato.

Surinam, Bartlett, ♂ *var.* Thorace antice pallido, basi etiam anguste testaceo, striolis duobus rufis discoidalibus, elytris basi tenuissime et circa scutellum pallidis.

Gorh. ♂, ♀. Thorace antice tantum pallido.

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HYAS, Castelnau.

Hyas denticornis, Germ. Ins. Nov. Spec. p. 67, ♂, ♀.
Brazil, all collections [Rio Jan., Brus. M.].

Hyas scissiventris, Perty Del. An. Art. p. 26. (Pl. VI. fig. 2.)
Brazil.

Obs.—Apparently a variety of the preceding, in which the central fascia is more divided than usual.

Hyas bipunctatus, n. sp.

Niger, thorace antice maculis duabus pallidis translucidis, angulis posterioribus subacutis, elytris thorace latioribus, postice angustatis, punctis duobus lateralibus paulo post medium sitis, pallidis. Subtus nigro-fuscus, abdomine medio tantum flavo notato.
Long. lin. 5—6; lat. 4½.

The characters of the apical segments of the abdomen of the male are similar to those of *denticornis*. The pygidial and ventral plates together form a circular opening.
Brazil? Three ♂. Coll. Gorh. (Norris).

Hyas rhomboidea, n. sp.

Fusca, thorace transversim subquadrato, lateribus antice paululum angustatis, vittis duabus croceis, disco nitido, elytris flavis dimidio apicali, maculisque duabus lateralibus, nigris; abdomine segmentis ventralibus medio flavis.
Long. lin. 8; lat. 4.

Mas.—Segmento sexto ventrali medio exciso, bidentato, dorsali bilobato, uncinato.

Oblong, parallel, rather flat elytra, a little wider than the thorax, the latter squarish, the front margin a little produced, little reflexed, the yellow vittæ are placed in two shallow foveæ, which extend from front to base, the disc and sides elevated, the former finely carinate. Scutellum black, shining. Elytra with the sides parallel, shoulders and apex rounded, sutural angle also round; the humeral callus is well raised, basal expanded margin reflexed, ochreous-yellow, a large lateral spot and the apical half, or rather less, smoky-black. Legs black, anterior trochanters yellow. Antennæ black, with fairly-long lamellæ.
The ventral claspers are singular and much more deve-

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loped than in *denticornis*, in which the sixth segment is simply cut out.

Nicaragua, Chontales. A single male. Coll. Godman and Salvin.

Hyas flabellata, Fab. Syst. El. ii. p. 106.

Cayenne, Paramaribo (Chev.).

Base of elytra and dentate pale fascia, sometimes united.

Hyas guttata, Fab. Syst. El. ii. p. 107.

Cayenne, Demerara. Brus. M.

Apical ventral segment acutely notched in ♂?; base of elytra and two lateral spots pale.

These two species are not distinguished in collections, if, indeed, they are distinct.

Hyas angularis, n. sp. (Chev. in lit.) Cratomorphus.

Late-ovata, obscure nigro-fumosa, opaca, thorace rufo, medio miniato leviter carinato, angulis posticis, et disco ad basin, infumatis, abdomine, apice dilutiori. ♂, ♀.

Long. lin. 5½—6; lat. 3½—4.

A species sent me by M. Chevrolat, under the name I adopt, is rather doubtfully assigned to this genus. It agrees very nearly with a larger specimen, which I obtained from Norris's Collection, and which I regard as the female. In the first, the anal opening is formed as in typical *Hyas*, but the apical segments are more deeply excised. The antennæ in this are wanting. In my Norrisian specimen, the two ventral apical plates are excised, but not deeply, the pygidial simply sinuate, and not convex so as to form any large opening. The antennæ are long, sub-dentate; two basal joints pale.

Mexico; Chev.

Cladodes Solier.

Cladodes lamellicornis, Mots. Etudes Ent. 1853, ii. 10. ♂, ♀. Rio Janeiro; Gorh.

Cladodes flabellicornis, Mots. l. c. p. 10. ♂.

Brazil; Gorh., Brus. M.

Cladodes Demoulini, Mots. l. c. p. 10.

Rio Janeiro, ♂; Santa Catharina, ♀? Brus. M., Gorh., and most collections.

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Cladodes stellata, n. sp.

Niger, prothorace, elytrisque flavis, his apice late, illo disco nigro.

Long. lin. 7; lat. 3½.

Very like *flabellicornis*, Mots., in colour, but smaller, and distinguished from it by the thorax being much more coarsely and deeply punctured on the yellow margin; in *flabellicornis* there is a short carina on the base of the black discoidal patch, this is absent in *stellata;* the scutellum is *yellow at its apex*, but pitchy-black at the base alone, and there is a slight dark stain on the elytra on each side of the scutellum which I have not observed in *flabellicornis*.

From *Demoulini*, to which it is more nearly related, the nearly total absence of the black round the scutellum, and the less extended black colour of the apex of the elytra distinguish it.

Rio Janeiro, Brus. M.

Cladodes ventralis, n. sp.

Niger, prothorace, elytris basi apiceque, abdominis segmentis quatuor primis in medio flavis.

Long. lin. 6½.

Black, prothorax yellow, small in proportion to the size of the insect, obsoletely and finely punctured, elytra fuscous black, with the basal third and apical margin yellow; the yellow portion of the base extends itself angularly about to the middle, the first two segments of the abdomen are nearly entirely yellow, the third and fourth yellow in the middle. Possibly this is the luminous portion, as spots are not evident on the seventh segment.

The lamellæ of the antennæ are rather long.

The single specimen of this species I have seen is a very old one, probably from Norris's collection; the elytra are somewhat shrivelled, but the specimen is otherwise perfect.

Hab. (?)—Gorh.

Cladodes nigricollis, n. sp.

Ater, elytris croceis, apice nigris.

Long. lin. 7.

Elytra little wider than the thorax, the latter finely rugose at the margins, disc rough, but scarcely punctured,

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opaque, the yellow of the elytra extends a little near the suture and margin towards the apex. Two luminous spots on seventh segment.

Ecuador, Brus. M.; a single specimen.

Cladodes plumosa, n. sp.

Croceo-flava, antennis, palpis, elytrorum dimidio apicali, abdomine, tibiis, tarsisque nigris, thorace brevi angulis posterioribus sub-rotundatis.

Long. lin. 7½.

Head yellow, antennæ and palpi much as in *C. flabellicornis*, M. Thorax of a different form to any of the preceding species, having the sides much more rounded, and contracted in to the hind angles, which are not produced, but meet the base (which is truncate, slightly sinuous) in an obtuse angle. Their anterior and lateral margins are hardly reflexed. Sides roughly, subrugosely punctured, disc nearly smooth, obsoletely carinate. Elytra with the sides little expanded, of the width of the thorax, the apical half smoky-black. Abdomen with the lateral lobes of the dorsal segments well developed, more rounded, and not so much produced backwards as in *flabellicornis*, the abdomen is hence wider and broader at the apex, the two luminous points of the ventral sixth segment are small, smooth, whitish and a little convex, they do not show through to the dorsal or pygidial surface, as is the case in some other species of *Cladodes*, and it may be hence concluded their light is only visible from beneath. The sterna, coxæ and femora are entirely of the crocus-yellow colour of the thorax and half-elytra, and this character alone separates this elegant species from any other of its allies; it is, however, similar in this respect to the insect described in this paper as *Phœnolis laciniatus*.

Nicaragua (Chontales); coll. Godman and Salvin.

ALYCHNUS, Kirsch., Berl. Ent. Zeit. 1865, p. 71.

Pygidium in the male angularly emarginate, in the female rounded. (Plate, fig. 9.)

This singular genus combines the characters of *Lucidota* with those of *Photinus*, the shortening of the elytra in the ♀, together with a moderate enlargement of the abdomen (which is sublobate in the ♂), is associated with apparently a total loss of luminosity, testified both by the

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absence of diaphanous segments, and small, feebly-developed eyes.

Alychnus xanthorrhaphus, Kirsch. l. c. p. 72.

Columbia, Brus. M., Guérin, Men. Gorh. (Norris), ♂, ♀.

Probably in most collections.

PLEOTOMUS, Leconte, Classif. Col. N. Am. I. p. 184, 1861.

The elytra here are rudimentary in the ♀, and feebly developed in the ♂, which is, however, quite capable of flight. The eyes are well developed, especially in the male. Abdomen sublobed in the ♂, pygidium rounded, faintly bisinuate in ♂, round in ♀, ventral, apical emarginate scarcely notched in the same sex.

Pleotomus pallens, Lec. New Spec. Col. I. p. 88.

Texas, U. S. America, Gorh.

PHÆNOLIS, genus novum.

Maxillary palpi.

Eyes small. Head entirely received into the prothorax. Antennæ 11-jointed; joint 1 stout, 2 short, 3—10 biflabellate, as in *Lamprocera Latreillei*. Prothorax contracted at the base, its margins broadly reflexed. Scutellum elongate. Elytra not expanded, their lateral margin a little reflexed. Abdomen having the dorsal segments lobed at the sides; segments four, five and six laciniate, the seventh widely bilobed; the anal, or corresponding ventral segment, being divided and produced in two recurved, spathulate lobes, at the base of which is a luminous spot.

Type, *Phænolis laciniatus*, Gorh.

Phænolis laciniatus, n. sp.

Elongatus, subparallelus, ochraceus, capite antennis, palpis, abdomine, tibiis, tarsis, elytrorumque apice late fusco-nigris.

Long. lin. 6—7. ♂, ♀ ?.

Head black, antennæ with the lamellæ equal on each side, long; breast ochreous-yellow, extreme tip of femora dusky, tibiæ and tarsis black, excepting the claws, which

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are yellow. Abdomen black, apical ventral segment bilobed, the lobes being central and with their margins reflexed; the luminous spot on this segment is whitish, smooth and convex. Thorax and elytra dull ochreous, the latter with their apical third smoky-black. Rather near the following species, from which the yellow breast will separate it.

Nicaragua, Chontales. Three specimens, ♂♀. Coll. Godman and Salvin.

Phœnolis ustulatus, Chevrolat (in lit.).

Niger, prothorace, elytrorumque basi, ochraceis.

Long. lin. 5—6. ♂.

Head, antennæ and palpi black; prothorax orange-yellow, inclining to brick-red or vermilion in the centre. Elytra smoky-black, excepting the basal third, the black colour extending indistinctly along the costal ridge to the humeral callus. Legs black, anterior and middle coxæ yellow at their base.

Zapote, Guatemala. Two specimens, apparently males, agree with a type sent to me by Chevrolat, with the above name, and which is, I think, a female from Mexico. This latter exhibits no trace of a luminous spot, but the anal segments are precisely similar, as well as the pectination of the antennæ, to those I think to be males.

Phœnolis ochraceus, n. sp.

Ochraceus, capite, antennis, palpis tibiis tarsisque fuscis, abdominis lateribus et apice leviter infuscatis.

Long. lin. 6—7. ♂, ♀♀.

Dull ochreous-yellow, with the antennæ, tibiæ and tarsi fuscous; the abdomen in the male (if I am correct in assigning one of the two specimens to that sex) is slightly darker, inclining to pitchy, at the sides and apex, while in the female? it is rather more infuscate still. The prothorax in the former is more acuminate in front, less contracted behind than in the female?, but in neither is any trace of luminous parts observable.

Nicaragua, Chontales. Coll. Godman and Salvin.

CALYPTOCEPHALUS (Gray, Griffith, An. Kingd. i. p. 370.)

Calyptocephalus fasciatus, Gray, loc. cit. (Pl. XXXIX. fig. 5.)

Guiana. Brit. M.

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The narrow thorax and fasciate elytra give this species a lyciform look.

POLLYCLASIS, Newman.

Pollyclasis bifarius, Say, Bost. Journ. i. p. 157.

The genus is very distinct from the last, and will, no doubt, stand. I have not been able to make a detailed examination of the type.

America borealis, United States. Brit. M.

ÆTHRA, Cast.

Abdomen lobed; sixth segment produced triangularly in middle.

Æthra marginata, Gray; Griff. An. Kingdom.

Brazil, Gorh.; Columbia, Brus. M.

Æthra lateralis, Cast. Essai, p. 133.

Brazil, Constancia, Gorh.; Brus. M.: coll. Guérin, Men., but ticketed "*marginata*, Gray." There is no type of M. Guérin's *lateralis* in this collection.

Æthra despecta, n. sp.

Rufo-brunnea, subnitida, capite, antennis, tibiis, tarsis, et abdomine nigris, thoracis disco, elytrisque margine excepto interdum infuscatis.

Long. lin. 4—4½.

Head black, crown shining, antennæ nearly as long as the body; joint 1 moderately stout, 2 short, 3—10 triangular, their innerside acuminate subpectinate, 11 elongate, and all compressed. Thorax short, almost semicircular, middle canaliculate, margins reflexed, and hind angles acute. Elytra four times the length of thorax, ochreous-red, in the majority of specimens a little infuscate, with the entire margin paler.

Nicaragua, Chontales; Godman and Salvin.

Columbia; Brus. M. and Gorh.

Æthra concolor, n. sp.

Parallela, flavo-testacea, capite nigro, thorace transverso angulis posticis acutis, antennis corporis longitudinis, serratis tibiis tarsisque nigro-fuscis.

Long. lin. 5.

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Mas.?—Pygidio margine apicali tridentato. (Plate, fig. 7.)

Closely allied to *A. despecta*, but the abdomen is yellow, and the wings are pale, and the antennæ are simply serrate, not, as in that species, almost pectinate.

Irazu, Costa Rica. 6,000 to 7,000 ft. alt.; coll. Godman and Salvin.

Æthra brunnipennis, n. sp.

Nigra, subnitida, elytris brunneo-flavis, thorace canaliculato, semicirculari.

Long. lin. 4½.

Allied to the preceding, and of the same form and size, but with the body entirely black, the elytra alone being yellow.

Hab. ?—Brus. M.; a single specimen.

VESTA, Castelnau Essai, p. 133.

Type, *V. Chevrolatii*.

I think it will be better to retain this name for the Eastern species. The sixth ventral segment is produced into a small tooth-like lobe in its centre, which overlies a seventh lobe-like segment. I have only seen one specimen that I can consider to be a female of this genus, viz., one of *V. Saturnalis*, in this the abdomen is very wide, the sixth segment angularly elevated in the middle, the seventh is triangularly cut out.

Vesta Chevrolatii, Cast. loc. cit.

Java; Brus. M.; Chevrolat; Gorh. ♂.

Vesta Saturnalis, n. sp.

Nigro-picea, prothorace, elytris abdominisque segmentis sexto et septimo brunneo-flavis, thorace disco canaliculato, margine laterali reflexo angulis posticis acutis.

Long. lin. 10—11.

Mas.—Segmento sexto ventrali acuminato producto.

Femina.—Eodem leviter emarginato, septimo triangulariter exciso.

Rather larger and wider than *V. Chevrolatii*. Thorax and elytra ochreous-yellow, the disc of the former a little

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shining, and with a deep longitudinal sulcation. Sides sinuous from the base to the apex, which is acuminate and produced as in *Chevrolatii*. Head, with the antennæ, palpi, underside of the body and legs black, the apex of the abdomen, and in the ♀ the sides, of two or three preceding segments yellow. Scutellum pitchy, elytra dull, three nervures apparent, the humeral one costate.

India, Naga Hills, 5,000 ft. alt., and Khasia Hills, Assam; coll. Gorh.; about twelve examples, one of which is a female.

Vesta Menetriesii, Mots. Etudes Ent. 1853, p. 43.

Java. Two specimens which I refer to this, without locality in Brus. M.

Vesta flavicollis, Mots. [Cratolampis] Etud. Ent. 1853, p. 43.

Philippine Isles; Gorh.

Vesta proxima, n. sp.

Flavo-rufa, capite, antennis, palpis, tibiis, tarsis elytrisque nigris.

Long. lin. 6.

Very near to *rufiventris*, Mots. [Cratolampis], which, without doubt, belongs to this genus. It appears to differ in the colour of the thighs, which in *proxima* are with the coxæ and whole of the body entirely yellow; the knees alone with the tibiæ and tarsi are black. The thorax is wider and more acuminate in front than in *flavicollis*, and is also with the scutellum clothed with short, yellow hairs.

Hab. ?—In my own Collection, with yellow ticket; probably India.

Vesta rufiventris, Mots. [Cratolampis] Etud. Ent. 1853, p. 43.

Philippine Isles; Gorh.

Three specimens appear to agree with this, but the thorax is not translucid in any part, and is scarcely channelled.

Vesta basalis, n. sp.

Rufa, subtus flava, capite, antennis, palpis tibiis, tarsis, elytrisque (basi excepto) nigris.

Long. lin. 5—6.

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This species is also very nearly allied to the two preceding, but differs in colour, having the base of the elytra red, varying in extent in the two specimens before me; they are also rather wide in proportion to their length.

Hab. ?—Two very old specimens with yellow tickets; coll. Gorh.

LUCERNUTA, Cast. Ann. Fr. 1833, p. 136.

Lucernuta fenestrata, Germ. Ins. n. sp. p. 66. ♂, ♀.

Brazil; Brus. M.; Gorh.

LUCIDOTA, Cast. loc. cit.

Lucidota flabellicornis, Fab. Spec. Ins. i. p. 252.

„ *pectinicornis*, Mots.

Brazil (Espirito Santo, &c.). ♂. Brit. M. coll. Banks, *Type*; ♂, ♀. Brus. M.; Gorh.

The male has the sixth, that is, the apical ventral segment broadly and triangularly cut out.

Lucidota compressicornis, Fab. Syst. El. ii. p. 103?

Brazil; Rio Grande; Gorh.

Three specimens, which have the antennæ longer, but with the joints 3—8 more compressed than in the preceding species, not flabellate but triangularly acuminate within, I refer to this. The abdomen has the pygidium long, faintly emarginate at the apex, the ventral apical segment not excised, but trilobate.

Lucidota, sp.?

Rio Janeiro; Gorh.

Antennæ only half the length of the body, compressed serrate, joints triangularly acuminate.

Lucidota albo-marginata, Solier.?

Hab.?—Gorh.

Two specimens in my collection from Norris.

Antennæ compressed, joints 3—8 scarcely serrate, rather longer than wide; anterior margin of thorax scarcely reflexed, translucent *on the margin* on each side of the apex. Elytra ovate, margin expanded, white in the middle, except the narrow reflexed edge. Abdomen with a transverse white luminous mark on the fifth segment, pygidium triangular, truncate.

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Lucidota Klugii, Dej. Cat.,—Mots.?

Hab.?—Gorh. A species labelled "Klugi," in Latreille's writing, scarcely agrees with Motschulsky's description, as the elytra have a wide pale yellow band, widest on the margins and suture.

Lucidota lunata, Mots. II. 1853, p. 41.

Brazil ["Constancia," "Tejuca"]; Gorh.

Antennæ sharply serrate, pygidium sinuate at apex. The largest species I have seen, 10—12 lines.

Lucidota Banoni, Cast. Ess. p. 137?

Hab.?—Gorh.

A specimen in my collection, labelled "*mellicula*," from Norris, seems to be this. The name is from Dej. Cat.

Lucidota thoracica, Cast. Essai, p. 137.
„ *penuata*, Dej.

The antennæ are as long as the body, their flabellæ more distant from each other at the base than usual, of the length of two joints or nearly, giving a more plume-like appearance than in any other species I know.

Columbia, Brus. M. *Hab.*?—Gorh. (Norris).

Lucidota proxima, n. sp.

Nigro-fusca, thorace rufo, vittâ medianâ nigrâ, coxis et femoribus anticis rufo-piceis, abdomine apice flavo.

Long. lin. 6.

Like *thoracica*, but distinct, the antennæ are shorter, a little more than half the body's length, compressed joints 3—8 internally acuminate, but only sharply so from joint 6. The underside is not yellow as in *thoracica*, Cast., under which name the specimen described was sent me by M. Chevrolat.

Cayenne, Gorh. (Chev.)

Lucidota nigripennis, Solier, Gay Hist. Chili, iv. p. 449.

Antennæ nearly as long as body, sub-serrate.

Chili, Brus. M.

Lucidota rhododera, Solier, loc. cit.

Antennæ half body's length.

Chili, Brit. M.

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Lucidota biplagiata, Mots. Bull. Mosc. i. p. 167.
,, *vulnerata*, Kiesenw.

Antennæ faintly serrate, nearly as long as body.

Japan; coll. Lewis. I am indebted to Mr. Lewis for a type.

Lucidota discicollis, Kiesenw.

Antennæ compressed, almost simple, shorter than in *biplagiata*.

Japan; coll. Lewis, from whom I received a type.

Lucidota tabida, Kiesenw.

Japan; coll. Lewis.

Lucidota angusticollis, Kiesenw.

Japan; coll. Lewis.

The Japanese species are allied both to the Chilian and North American.

Lucidota atra, Ol. Ent. ii. 28. (Pl. III. fig. 28.)

United States, Brus. M.; Gorh.

Var.? Nicaragua (Chontales); coll. Godman and Salvin.

The pygidium has its hind margin sinuate and centre finely notched; the ventral segment appears cuspidate, and two or three preceding dorsal segments are lobed.

Lucidota Californica, n. sp.

Aterrima, thorace (disco et margine laterali tenui exceptis) læte rufo, angulis posticis rectis, antennis subfiliformibus leviter compressis.

Long. lin. 3½.

California; Chevrolat, to whom I am indebted for the species.

Lucidota exstincta, n. sp.

Magis linearis, aterrima, prothorace sanguineo vittâ discoidali latâ nigrâ, in medio et ad basin inæqualiter impresso.

Long. lin. 3¾. ♀.

Closely resembling *Lucidota Californica*, from which it differs in not having the lateral margins of the prothorax

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narrowly black, and the central black vitta wider. The elytra have the nervures distinct, especially at the base.

It is very difficult to decide whether this species belongs to *Photinus* or *Lucidota*, but taking the very short 2nd joint of the antennæ into account, I think it is better placed in the latter.

Guatemala City, and Duenas; coll. Godman and Salvin.

Lucidota Boliviana, n. sp.

Nigro-fumosa, thorace rufo, disco leviter canaliculato angulis posticis paulo retrorsum acutis, antennis acute serratis, corporis vix longitudine æqualibus; coxis, femoribus et tibiis anterioribus et intermediis rufo-fuscis, abdominis apice flavo.

Long. lin. $5\frac{1}{2}$.

Like *Banoni*, but the scutellum and breast are smoky-black.

Bolivia, Brus. M. (Guérin); a single specimen.

Lucidota bella, n. sp.

Atra, subnitida, thorace lucido flavo, disco miniato, coxis anticis et intermediis rufis, scutello flavo.

Long. lin. 4—5.

Head black; antennæ about half the body's length, subserrate, entirely black, with the exception that the basal and short 2nd joint are sometimes paler in the articulation; elytra shining black, with the nervures apparent, especially the discoid; thorax semicircular, the disc deeply channelled, but the sulcus not reaching the margins; the hinder angles are acute and produced backwards.

Guatemala, Zapote; coll. Godman and Salvin.

Lucidota silphoides, n. sp.

Aterrima, antennis brevibus, sub-pectinatis, thorace transverso, albo, disco nigro fortiter longitudinaliter impresso, margine valde reflexo, abdominis segmentis duobus penultimis albis, fusco externe notatis.

Long. lin. $4\frac{3}{4}$. ♀.

Of the form of *L. bella*, but larger, and with the thorax more transverse, the hinder angles a little produced backwards. Elytra rather widened toward the apex, deep sooty-black with nervures distinct. Scutellum black.

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Rio Sarstoon, British Honduras. Coll. Godman and Salvin.

Lucidota apicalis, n. sp.

Atra, thorace (elytris duplo angustiore), abdominis segmentis duobus ultimis, pygidio et antennarum articulis tribus vel quatuor apicalibus albis, antennis corpore fere longioribus compressis serratis.

Long. lin. 5. ♂, ♀.

The three pure white apical joints of the antennæ give this species a very striking appearance; in one specimen the 8th joint is also white, except at its base; the thorax is semicircular, small, entirely whitish-yellow. The pygidium is three-lobed at the apical margin, narrowed at the base, and rounded on the sides; the sub-apical ventral plate is lobed at the sides, emarginate, and embraces the apical, conical, eighth plate. (Plate, fig. 10.) The three specimens I have seen agree in this respect, and are, I conclude, males.

Irazu, Costa Rica; alt. 6,000 to 7,000 ft. Coll. Godman and Salvin.

Lucidota rubricollis, n. sp.

Atra, subnitida, thorace lucido flavo, disco aurantiaco, breviter semicirculari, antennis pectinatis articulis basalibus extus pallidis, pedibus anticis basi et interne pallide flavis.

Long. lin. 4.

This little species is more ovate than *bella*, and is abundantly distinct. The antennæ are pectinate, as long in proportion (the species being smaller). The thorax is more transverse, not so brightly coloured, and with the discal furrow less pronounced. The scutellum black. The abdomen is entirely black, and I do not observe any trace of the luminous portion, nor can I, at present, distinguish the sexes.

Nicaragua, Chontales; coll. Godman and Salvin.

Lucidota fulgurans, n. sp.

Nigro-fumosa, thorace oblongo antice acuminato, flavo, disco et prosterno nigris, elytris flavis, circum scutellum, et ad apicem, late nigro-fumosis, antennis modice flabellatis.

Long. lin. 8.

Head, antennæ and palpi black. Antennæ two-thirds of the body's length, joints 3—10 flabellate, the lamellæ

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being not so long as in *flabellicornis*, and equal to each other, excepting that on the 10th joint, which is shorter. Thorax, with the expanded lateral margins, yellow; the disc is pitchy-black from the base to near the apex, but leaving the anterior margin yellow; hind angles acute. Scutellum black. Elytra black round the scutellum, as far as the humerus, and the apical portion (rather less than half) yellow in the central half, and lateral margin at the base, dull. Abdomen, with the dorsal segments, acute at the side, the sixth sublobate, the pygidial having the apex truncate, emarginate sinuosely, the sixth ventral with a luminous spot on each side, the seventh small, lobiform, compressed at the apex.

Brazil, Brus. M.; a single specimen.

Lucidota apicicornis, n. sp.

Fusco-nigra, thoracis limbo, elytrorum margine laterali, pedibus basi, et antennarum articulis tribus apicalibus albis, thoracis disco nitido miniato in medio, et ad basin infuscato.

Long. lin. 5.

The antennæ are about the length of the body, the intermediate joints triangular, longer than wide, compressed, serrate; the 9th white, but infuscate at its base, the 10th and 11th entirely white. The thorax equal in length and width at the base, white, with the disc and prosternal parts of a beautiful carmine, more or less infuscate in the centre. Abdomen white or yellowish at the apex.

Nicaragua, Chontales; coll. Godman and Salvin.

Lucidota Osculatii, Guérin, Wiener Verzeichiss v. 1855, p. 580. Columbia, Brus. M.; Nicaragua, Chontales; coll. Godman and Salvin.

Obs.—The Nicaragua specimens differ from the type in being smaller, in having the antennæ less acutely serrate and the upper surface duller; but as the type is at present unique, it will be better not to separate them at present.

A second specimen in Guérin's Coll., Brus. M., is, I think, to be doubtfully referred to this species; it is from Caraccas.

Lucidota limbata, n. sp.

Sordide nigro-picea, thorace elongato pileato, rufo-flavo,

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sub-miniato; scutello, elytrorum limbo toto, pedibus basi, et abdominis segmentis duobus penultimis flavis.

Long. lin. 5.

The principal points in which this differs from *Osculatii* are that the thorax is longer and without a dark discoidal patch, and that the fifth ventral segment is pale; in other respects it is more nearly allied to the Nicaragua specimens doubtfully referred to *Osculatii*.

Nicaragua, Chontales; coll. Godman and Salvin.

Lucidota tricolor, n. sp. (Chevr. in litt.)

Nigro-subfusca, thorace disco utrinque miniato-maculato, elytris margine explanato medio albo, abdominis segmento quinto puncto albo lucido.

Long. lin. 4.

Oblong, not much widened, thorax rather longer than wide, front semicircular. Head black, antennæ with rather long but narrow lamellæ. Elytra with the expanded portion of the margin white, yet leaving the extreme limb fuscous. This and the following differ from any other *Lucidotæ* in having a luminous round point on the centre of the fifth ventral plate.

Brazil (Chevrolat), whom I thank for the specimen described.

Lucidota quadriguttata, n. sp.

Nigro-fusca, thoracis margine, et elytrorum margine explanato in medio, guttisque duabus prope suturam, post medium sitis albis; pedibus basi, abdominis apice, et puncto in segmento quinto flavidis.

Long. lin. 5.

Antennæ exceeding half the length of the body, compressed, and with lamellæ to the third and succeeding joints, which, however, are closely adpressed and not easily observed in the specimens I have. The thorax has the disc pitchy and shining, and channelled in the basal half. The elytra are dull fuscous black, on which the white markings are conspicuous; these are a lateral vitta on the expanded margin (the extreme limb being dark) and nearer to the base than the apex, and a less distinct oval spot on each elytron near the suture and opposite the end of each white sub-margin. The abdominal spot is eburnised yellowish-white.

Bahia; coll. Gorh. Brazil; Brus. M.

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PHOTINUS, Castelnau, Ann. Fr. p. 141.

Type, *P. coruscus*, Linn.

This genus is the one of which the study is attended with most difficulty among the *Lampyridæ*. The characters laid down by Castelnau are too general, and include the genera *Cratomorphus*, *Lucernula*, *Aspidosoma* and *Photuris*. No account is taken of the sexual characters to be found in the terminal plates of the abdomen. Motschulsky's numerous subdivisions are untenable, being based chiefly on the number of light-giving segments, or rather on those apparently so, for it is not known that this effect is confined to the white or yellow portions of the abdomen. Lacordaire has left little to be desired in his exhaustive resumé of characters, and he has described the sexual distinctions [Genera des Col. iv. p. 306], but he appears to have considered them not to have generic value. I have, however, found them to be very constant and useful in this respect. The three last segments beneath and the pygidial above are frequently emarginate, sinuate or triangularly notched. The males are in general much commoner in collections than the females. They have eight ventral plates, the seventh generally very short. The females have the seventh or apical ventral plate nearly as wide at its base as the preceding one, and triangularly narrowed to the apex, which is always cut out in a notch in this genus. In one species, at least, *longipennis*, Mots., the abdomen is much enlarged and the elytra are shortened in the female. M. Lacordaire cites *longipennis*, Mots., as the type, but it is inconvenient to take that species, for Castelnau did not give it under any name, and it was not described till 1853. I have taken *coruscus*, L., as being the earliest species described.

I have found it convenient to retain *Pyrectomena*, Lec., as a distinct genus. The species forming this group have a very peculiar and uniform facies, the abdominal plates are also sufficiently different from true *Photinus*. (See Plate, fig. 14.)*

I now briefly recite those species which, up to the present time, I have been able to identify; my knowledge of the described species is not sufficient to justify me in describing many of the South American species. I have, however, given the characters of the very interesting collection lately arrived from Guatemala.

* The Plate to illustrate the abdominal segments will appear in the next Part.

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I.—LINNÆAN SPECIES.

Photinus coruscus, L. Syst. Nat. i. p. 644.

Am. Bor.; all collections.

Photinus pyralis, L. loc. cit., nec Fab. Ent. Syst. 2, 99, 6.

Am. Bor.; all collections.

The French collections generally refer *marginellus*, Lec., to *pyralis*, Lin.; and with this the type in the Banksian Coll. agrees. *L. pyralis*, Oliv. Ent. ii. 28, is named *Olivieri* by Castelnau, Ann. Fr. 1832, p. 141.

The *pyralis* of my collection is 5—7 lines in length, the elytra entirely margined with yellow, and the thorax with a quadrate, dark central spot.

[*Photinus marginatus*, L. and *phosphoreus*, L. I have not seen types.]

II.—FABRICIAN SPECIES.

Photinus obscurus, Fab. Syst. Ent. p. 200.

Chili; Mus. Brit. and Brus., Coll. Chev., &c.

Photinus vittatus, Fab. Ent. Syst. i. 2, p. 102; Olivier ii. 28, p. 23. ?

San Domingo; coll. Chev.

Photinus cinctus, Fab. Ent. Syst. 2, 99, 7.

Pulicandor; Mus. Banks., B. M., Coll. Chev., &c.

About 4 lines, thorax red; elytra fuscous, with pale suture and margins.

[The following are also referred to Fab., but I have not found a type of them in the collections I have examined: *analis*, F. Syst. El. ii. 100; *guttula*, F. l. c. 101; *pallens*, F. Syst. Ent. Sup. 124; *planicornis*, F. Syst. El. 104; *pectinata*, F. Syst. Ent. App. 824.]

III.—OLIVIER.

Photinus rufus, Ol. Ent. ii. 28, p. 28.

Antilles; coll. Chev.

The remaining Olivierian species will be identified by M. E. Olivier, who is working at this group.

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IV.—CASTELNAU.

Photinus modestus, Cast. Essai Ann. Fr. ii. p. 138. [*Lucidota.*]

Brazil; coll. Gorh., e Murray.

Very much of the size and form of *Alecton discoidalis*. Doubtfully of this genus, but not a *Lucidota*.

V.—OTHER AUTHORS.

Photinus longipennis, Mots. Etud. Ent. ii. p. 37.

Columbia. ♂. All collections. ♀. Mus. Brus., and Gorh. (Plate, fig. 13.)

The ♀ has short elytra and the abdomen enlarged.

Photinus lunifer, Esch. Ent. i. p. 22.

Brazil; coll. Chev., Gorham, Mus. Brus.

Photinus cinctus, Mots. Etud. Ent. ii. p. 37, nec Fab.

Columbia; Mus. Brus. [Guér. Men.]

Length 8 lines. Near *longipennis*. Gemminger has renamed it *circumcinctus*. Col. Heft. vi. 1870.

Photinus coronatus, Chev. in litt.

Broad, rather pale fuscous; elytra darker at the base, the suture narrowly, the sides widely margined white; thorax with the disc convex, dark fuscous, the front and lateral margin broadly white.

Long. 6—7 lin.

Columbia; coll. Chev., Mus. Brus.

Photinus congruus, Chev. Col. Mes. Cent. i.

Mexico; coll. Chev., Mus. Brus.

Photinus cinctellus, Chev. in litt.

Oblongo-ovalis, fuscus, thorace nitido, disco nigro, utrinque miniato, margine pallido, elytris tenuiter flavo-cinctis, abdomine segmentis tribus ultimis albis.

Long. lin. 5—6. ♂, ♀.

♂. Segmento ventrali sexto leviter exciso, sexto per-brevi apicali minuto ovali. ♀. Segmento sexto leviter sinuato, septimo triangulari, apice exciso.

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Mexico; coll. Chev., Gorham; Guatemala [Zapote]; Nicaragua [Chontales]; Irazu; coll. Godman and Salvin.
This is not *cinctella*, Mots.

Photinus suturalis, Guér. MS. nec Schönh.

The species thus labelled both in my own collection [Norris] and in Mus. Brus. [Guér.] is *Alychnus xanthorrhaphus*, Kirsch. Berl. Zeit. 1865, p. 72. It is 8 lines in length, black, with the suture yellow.
The female with a larger thorax, and elytra shorter than abdomen; underside and legs entirely black.
Columbia.

Photinus vittiger, Gyll. Schönh. Syn. Ins. iii. App. p. 21.

Martinique; Mus. Brus.; Guadaloupe; coll. Chev.
Hab. ?—Coll. Gorh.

Photinus littoralis, Coquerel, Mots. Etud. Ent. 1853, 35.

Martinique; Mus. Brus. [Guérin Men.]
Not distinct, I think, from *vittiger*.

Photinus blandus, Mots. Etud. Ent. 1854, 25.

Cuba; Mus. Brus. [Guérin Men.]; coll. Chev.

Photinus discoideus, Sch.? Chev. in litt.

Guadaloupe; coll. Chev.
Like *blandus*, elytra wider and pale at the base.

Photinus gamma, Jacq. Duv. Hist. Cubæ vii. p. 85.

Cuba; Mus. Brus. [Guérin Men.]

Photinus limbipennis, Jacq. Duv. l. c. p. 86. Cast.?

Cuba; coll. Chev.
Parallel, narrow pale fuscous elytra with the margins and suture pale, thorax pale at the base, eyes very large, pygidium and ventral two last segments white.
Long. lin. 3.

Photinus fuscus, Germ. Ins., n. sp., p. 63.

Buenos Ayres; coll. Chev.; Maldonado, Mus. Brus.; Bahia; coll. Gorh. The latter locality perhaps in error.

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Photinus autumnalis, Melsh. Proc. Ac. Phil. ii. p. 303.

The smaller, narrower, and blacker form of *coruscus*, L., from which it is not, I believe, specifically distinct.

Pennsylvania, U. S. Most collections.

[I have not seen a type of *californica*, Mots., but judging from the description, it is a large form of *corusca*, L. Crotch gives it as a sub-species of *facula*, Lec. *Pyropyga californica*, Mots. l. c. p. 5, is quite a different species, 2½ lines long, thorax with two red marks, and will want a new name.]

Photinus nigricans, Say, Journ. Ac. Phil. iii. 179.

Massachusetts, U. S.

Photinus decipiens, Harris, Trans. Hartf. 1836, p. 74.

Texas, U. S.

Very near *nigricans*, Say.

Photinus minutus, Lec. Syn. p. 333.

United States (New Orleans).

Photinus ardens, Lec. l. c. p. 334.

Michigan, U. S.

Photinus lineellus, Lec. l. c. p. 335.

Texas, U. S.

Photinus marginellus, Lec. l. c. p. 335.

Missouri, U. S. Very near *lineellus*. New York, Mus. Brus.

VI.—NEW SPECIES.

Photinus Guatemalæ, n. sp.

Niger, sat nitidus, thorace disco nigro nitido, lateribus rubricatis, limbo omni tenuiter nigro, scutellum læve, abdominis segmento sexto flavo, genitali nigro. ♂, ♀.

Long. lin. 5½—6½.

Elongate, rather shining, black, thorax (at least in the male) a little longer than wide, posterior angles right, disc smooth and shining, with two impressions at the base, and very obsoletely canaliculate, the black portion transversely widened near the base, the entire limb very narrowly black, the portion between this and the disc, as well as the

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pleuræ beneath, being yellowish-red. Antennæ half the body's length, compressed. Elytra sub-coriaceous, nervures hardly visible, margin not expanded below the middle. Abdomen in the male with the sixth segment emarginate, and the seventh acutely cut out, the genital dark; in the female the sixth is triangularly cut out and a little compressed in the middle, and the seventh is fuscous with the sides yellowish.

Guatemala, Calderas; coll. Godman and Salvin.

Photinus lunicollis, n. sp.

Oblongo-ovalis, griseo-niger, opacus, thorace sub-nitido, utrinque vittâ obliquâ luteâ in medio miniatâ, margine laterali nigro-fusco, punctorum lineâ submarginali, disco canaliculato.

Long. lin. 4—4½. ♂, ♀.

Depressed, thorax short, semicircular, posterior angles acute, the oblique vitta is of a beautiful carmine colour in the middle, and this colour also extends beneath to the pleural portion (probably, however, the colour fades as the specimens dry in the collection). Scutellum punctured. Elytra greyish-black, obsoletely punctured, the lateral margins more expanded than in the preceding species. Antennæ only of moderate length. Abdomen black, with only two faintly paler spots on the seventh plate in both sexes.

Guatemala, Capetillo; coll. Godman and Salvin.

Obs.—This species and *P. Guatemalæ* have a good deal of resemblance to *P. coruscus*, L.

Photinus ruficollis, n. sp.

Fumeo-niger, opacus, thorace sub-nitido luteo disco rubricato, canaliculato, abdomine, coxis et femoribus pallide flavis.

Long. lin. 4—5. ♂, ♀.

Head black, mouth and palpi pale, tinged with fuscous, antennæ half the body's length; thorax rather short, hind angles acute, wider at the base in the female, margin punctured; scutellum red. Elytra greyish, or smoky-black, nervures rather distinct. Abdomen nearly entirely pale yellow in the male, more clouded with fuscous in the female. Sexual characters as usual in this genus, *i. e.*, the sixth and seventh segments of the ventral side are

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emarginate, and the eighth is small and notched in the male, while in the female the seventh is triangular and notched, the fifth and sixth being simple.

Guatemala, Zapote; coll. Godman and Salvin.

Obs.—The colours and patterns of the *Lampyridæ* are repeated so frequently throughout the genera that I shall in general only notice these resemblances briefly. The present species closely assimilates itself to *Lucidota bella* (*ante*, p. 18), as well as to two species of *Photuris*, described hereafter from the same country.

Photinus fumigatus, n. sp.

Fumeo-niger, sub-opacus, thorace luteo, disco nitido nigro, utrinque miniato, elytris margine laterali, obscure brunneis, abdomine toto nigro. ♂, ♀.

Long. lin. 3—3½.

The present begins a series of small species of the group to which *nigricans*, Say, and *minutus*, Lec., belong, and which are extremely difficult to separate; the colour of the thorax and elytra, and of the abdomen, are the best characters at present known to me. This little species has the thorax with the disc rather convex and smooth, *not* channelled, the sides are rather brightly red, and the margins luteous, including the front. The abdomen is wholly black.

Zapote; coll. Godman and Salvin.

Photinus affinis, n. sp.

Niger, opacus, thorace breviori, disco nigro lateribus albis, canaliculato. Abdomine segmentis sexto et septimo (basi fuscis) albis.

Long. lin. 3½. ♂, ♀.

Rather larger in bulk than *fumigatus*, of a deeper black colour, the black portion of the disc of the thorax triangular, with its apex near the front margin, and the sides only of the thorax whitish, in some specimens a carmine spot not very brightly developed on each side of the discoidal patch. Abdomen *whitish at the apex*. Sexual characters as usual, but in the male the sixth segment scarcely emarginate, only sinuate.

Guatemala, Calderas and Capetillo; coll. Godman and Salvin.

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Photinus plumbeus, n. sp.

Plumbeo-niger, thorace canaliculato lateribus albis, elytrorum margine extimo, suturâ tenuiter abdominisque segmentis quinto, sexto, septimo, et maris genitali albis.

Long. lin. 2¾—3. ♂, ♀.

Rather smaller and more feebly built than either *affinis* or *fumigatus*. The thorax, also, is narrower, and the margins of the elytra and the suture *very narrowly* pale; the general colour is more leaden or griseous, but it may at once be distinguished from either by the *almost white abdomen*, which is fuscous only in the three basal plates.

Zapote; coll. Godman and Salvin.

Photinus perlucens, n. sp.

Niger, obscure subviolaceus, magis elongatus, thoracis disco fortius canaliculato, nigro, lateribus late flavis; elytris paulo micantibus postice angustatis; abdominis segmentis quarto ad apicem, quinto, sexto, et septimo perbrevi, læte flavis, octavo maris vel genitali, fusco.

Long. lin. 5. ♂.

Though there are but two male specimens of this in the Guatemala collection at present, it is very distinct by its elongate oval form, rather short antennæ, black body and legs, and clear yellow apical portion of the abdomen.

Calderas; coll. Godman and Salvin.

Photinus pulchellus, n. sp.

Plumbeo-niger, thorace nitido, medio canaliculato disco nigro, utrinque roseo, lateribus et apice albis, elytris subparallelis, margine et suturâ in medio, pedibus basi, et abdomine albis. ♂, ♀.

Long. lin. 3¾.

This species is allied to *plumbeus* by its nearly wholly white abdomen, but the form is more parallel, the thorax is larger and very beautifully marked with a rosy tint on each side of the disc, and the *margin of the elytra* is widely, and the *suture narrowly, white in their middle.*

The abdomen, as usual in those species which have very much of their ventral portion white, is more infuscate at its base and apex in the female than in the male.

It is more closely allied to the following, which is, perhaps, only a variety.

Zapote; coll. Godman and Salvin.

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Photinus concinnus, n. sp.

Scarcely differs from *pulchellus*, but is rather smaller. The thorax shows less traces of the rosy colour, and the suture is of the same leaden colour as the rest of the elytra; their lateral margins are pale, but not beyond three-quarters of their length.

Zapote; coll. Godman and Salvin.

Photinus sanguinicollis, n. sp.

Nigro-griseus, thorace sanguineo, limbo toto anguste, et disco vittâ tenui nigris, abdominis segmentis tribus ultimis pallide flavis. ♀.

Long. lin. 5½.

Greyish-black, thorax of a beautiful blood-red, narrowly and evenly margined with black, disc shining, with a narrow black vitta scarcely touching the front or hind margin, sides with distinct, scattered punctures and a submarginal row, which become confused towards the apex and hinder angles.

Irazu, Costa Rica, alt. 6,000 to 7,000 ft.; coll. Godman and Salvin.

Photinus aurora, n. sp.

Nigro-griseus, vel plumbeus, thorace læte flavo, disco basi nigro-piceo, utrinque miniato.

Long. lin. 5½.

This very beautiful species is allied to the last, but the thorax is rather longer, a little contracted at the hind angles, which are acute, and is of a most beautiful gamboge-yellow; the disc is a little uneven and irregularly canaliculate in the centre, and is dark pitchy-black from the base to about the middle, this dark portion being widened at the base and nearly surrounded with bright vermilion-red. The elytra are fuscous or leaden-black, with but faint traces of raised nervures. The abdomen is entirely black.

Irazu mountains and Rio Susio, Costa Rica; coll. Godman and Salvin.

Photinus amabilis, n. sp.

Nigro-griseus, thorace albido, disco miniato vittâ medianâ ad basin latiori nigro-piceo, elytris albo-subviridi conciune marginatis. ♀.

Long. lin. 5.

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Femina abdominis segmento quinto maculâ parvâ flavâ.

Head, antennæ, legs, breast and abdomen, with the exception of a yellow spot on the fifth segment, fuscous-black. Thorax nearly semicircular, sides straight at the hind angles, which are acute, the base being, as usual, reflexed before meeting the sides; disc not channelled, with a broad black patch on the base, narrowing suddenly above the middle and not reaching the front; carmine where the black patch narrows, and the lateral margins widely white. Elytra evenly margined from the base to the apex with white, which has a greenish tinge in the single specimen I have seen.

Rio Susio, Costa Rica; coll. Godman and Salvin.

Photinus perelegans, n. sp.

Elongatus, fuscus, thorace longiori, angulis posticis fere rectis, albido, disco late nigro, medio canaliculato utrinque miniato, elytrorum, margine laterali et suturâ conjunctim tenuiter albidis. ♂, ♀.

Long. lin. 7.

Mas.—Oculis majoribus, abdominis segmentis quinto et sexto læte flavis, utrinque puncto impressis, septimo perbrevi, apicali parvo ovali.

Fem.—Abdominis segmento quinto ventrali albo flavescente, basi fusco notato; sexto fuscescente, leviter exciso; septimo triangulari, apice exciso.

Head black, antennæ, palpi, legs and body beneath entirely pitchy-fuscous, the extreme base of the thighs alone touched with pale yellow. The thorax elongate, hat-shaped, the front margin a little more prominent and reflexed in the ♀, disc rather convex, broadly pitchy-black; this colour, in the male at any rate, not reaching the front, but produced transversely at the base, and showing on each side the rosy colour of the pleural fold beneath.

The elytra are leaden-black, very finely punctured, the suture and entire lateral margin narrowly whitish-yellow, the sutural and discoid nervure a little distinct. Beneath the body is dark, pitchy-black; and in the male the first four segments of the abdomen of the same colour, but the apical margin of the fourth very narrowly testaceous. The fifth and sixth segments are nearly twice the width of those preceding, clear testaceous yellow-whitish towards their margins on the ventral side, but fuscous on the dorsal

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side, with only their margins yellow. The seventh is so short as only just to be visible; the eighth, or apical, lobe-shaped, these two being clouded. The pygidial segment is diaphanous, a little clouded in its centre. In the female the fifth ventral plate alone is white. This species is both in general appearance and by its sexual characters obviously allied to *longipennis*, Mots., from which it may be distinguished by its much smaller size and other characters given above. The elytra of the female are not reduced in size as in the female of that species.

Guatemala, Calderas; and River Sarstoon, British Honduras. Coll. Godman and Salvin.

PYRECTOMENA (Dej.), Mots., Leconte.

Type, *P. vitticollis*, Mots.

The species composing this genus agree in several characters in which they differ from the other *Photini*. They are depressed, and parallel in form. The thorax has its sides sinuate near the apex, which is often produced, and the sides more or less reflexed; it is more or less carinate; the antennæ are short, not much longer than the head and thorax. The male has the fifth and sixth ventral plates yellow and translucent, with impressions as in certain *Photini*, but the seventh ventral plate is in the form of a truncate triangle, the apex being scarcely emarginate, and the apical or eighth plate is so small as not always to be seen. The pygidial plate is triangularly and deeply cut out in the male, truncate in the female. Six species are referable to this genus, of those already described; *dorsalis*, Mots., I have not yet been able to identify, and it may belong to another genus.

Pyrectomena angulata, Say, Journ. Ac. Phil. v. 162.
America, Bor.; Texas, coll. Gorh.; Mus. Brus. ♂, ♀.

Pyrectomena borealis, Randall, Bost. Journ. ii. 16.
Michigan; coll. Gorh. ♀.

Pyrectomena angustata, Lec. Syn. 336.
Texas; coll. Gorh. ♂.

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[*Pyrectomena lucifer*], Melsh. Proc. Ac. Phil. ii. 304.
„ *linearis*, Lec. Syn. 336.
Pennsylvania, Georgia. Not seen by me.

Pyrectomena vitticollis, Mots. Etud. Ent. ii. 38.
St. Domingo; coll. Gorh. (Norris); Chevr. ♀.

[*Pyrectomena dorsalis*], Mots. Etud. Ent. ii. 38.
Mexico. Probably not of this genus.

Pyrectomena striatella, n. sp.

Oblonga, subfusca, thorace pallide flavo, vittâ discoidali prope basin transverse dilatatâ, maculisque duabus lateralibus nigris, disco tenuiter carinato, elytris, margine sat late, suturâ, lineisque duabus elevatis pallide flavis.

Long. lin. 5—6. ♂, ♀.

Mas.—Abdominis segmentis quinto et sexto læte flavis, septima fusco albo-marginatis.

Fem.—Abdominis segmentis basi fuscis. (Plate, fig. 14.)

Smaller than *angulata*, Say. The lateral dark patches and the discoidal mark do not touch the margin or base, the disc on each side and the pleural fold are orange-red. The sutural, discoidal and outer nervure are raised, the two inner obscurely testaceous.

Guatemala, Zapote and Duenas; coll. Godman and Salvin.

Cratomorphus, Mots. Etud. Ent. i. p. 35.

Type, *Crat. giganteus*, Drury, Ill. Ins. iii. 75. (Pl. L. fig. 2.)

Mots. describes the pygidium of the ♀ as "triangular, truncate and feebly sinuate." Lacordaire says it is "strongly trilobed in both sexes." Neither description is exact. This segment varies in the different species, and in *giganteus* (= *splendida*, Lac., *Fabricii*, Cast.) that of the ♀ has three large angular lobes, the middle being the most prominent, while in the ♂ it is transversely square, the hind margin simply sinuate. (Plate, fig. 15.)

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Cratomorphus giganteus, Drury.

Brazil. All collections. ♂, ♀.

Obs.—A variety occurs in which the expanded margin is entirely pale.

Cratomorphus fuscipennis, Mots. Etud. Ent. ii. p. 33.

C. latus, Kirsch. (Berl. Zeit. 1865, 72) appears to agree with this, as well as *albo-marginatus*, Guérin. Mus. Brus., Cast. ? The lateral lobes of the pygidium are much smaller in the ♀ than in *giganteus*.

Buenos Ayres? Mus. Brus.

Brazil? Columbia. Chontales, Nicaragua; coll. Godman and Salvin.

Cratomorphus vittatus, Kirsch. l. c.

Ecuador? Mus. Brus. ♂. Pygid. feebly sinuate.

Cratomorphus diaphanus, Germ. ?

Brazil; Mus. Brus. ♀.

More elongate than *giganteus*. Elytra with the expanded margin white, ♀ pygidium feebly lobed at the sides, apex prominent rounded. (Plate, fig. 16.)

Cratomorphus bifenestratus, n. sp.

Oblongus, fusco-testaceus, thorace disco postice piceo, medio tenuiter flavo carinato, antice maculis duabus diaphanis scutello piceo elytris subcostatis.

Long. lin. 10, ♂.—13, ♀.

Mas.—Pygidio trilobato, lobo apicali transversim quadrato, truncato, lateralibus sat magnis apice rotundatis.

Fem.—Pygidio medio fortiter producto, apice rotundato, ventrali eo conveniente apice acute diviso; pectore et abdominis segmentis quatuor piceo-fuscis marginibus flavis.

The two specimens in the Brussels Museum of this species seem to me very distinct from any species described, and it will be best recognized by the diaphanous patches on the front portion of the thorax, by the yellow fine carina which extends from the base to the front margin, dividing a basal, rhomboidal, pitchy patch into two

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portions; by the pitchy scutellum and callus; and by the form of the pygidial segment. (Plate, fig. 17.)

The abdomen is entirely pale in the ♂, with the two dorsal segments preceding the pygidial, but feebly lobed in the ♀, the dorsal segments are only acutely angled, not produced backwards. The antennæ in both sexes are fuscous, with two basal joints pale; legs pale at the base; apex of femora, tibiæ, and tarsi fuscous.

Bahia; Mus. Brus.

Cratomorphus elongatus, n. sp.

Elongatus, nigro-piceus, thorace testaceo, areolis duabus antice diaphanis, disco postice piceo, elytris flavo marginatis, vix expansis.

Long. lin. 12. ♂.

Mas.—Pygidio apice subsinuatim truncato, segmentis duobus precedentibus angulariter lobatis, his flavo marginatis, segmentis ventralibus 5to et 6to in medio flavo-lucidis, 7mo apice vix producto, apicali parvo.

Hab.?—Huanao; Mus. Brus.

Very distinct both by the elongate form and dark elytra. The sixth ventral segment has a small notch.

Cratomorphus insignis, n. sp.

Elongatus, nigro-fuscus, thorace testaceo areolis duabus antice diaphanis, disco postice fusco, maculâ basali testaceo. Elytris suturâ tenuissime, et vittis duabus lateralibus submarginalibus flavis, femorum basi, abdominisque segmentis quinto et sexto flavis.

Long. lin. 10. ♂.

Mas.—Pygidio, utrinque lobato, lobis parvis sub-lanceolatis, apice rotundato; segmento septimo ventrali fortiter angulariter exciso, medio longe mucronato. (Plate, fig. 18.)

Allied to *elongatus*, less shining, the elytra smoky-black, with nervures more visible, body beneath pitchy, or fuscous, with the femora at their base, coxæ, sternal sutures, fifth and sixth ventral, and margins of the two penultimate dorsal plates testaceous.

Hab.?—Brazil? Mus. Brus.; a single male from the collection of C. Van Volxem.

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Cratomorphus concolor, Perty Del. An. Art. p. 27.

Rio Janeiro, Callao; Mus. Brus.; coll. Gorh.; B. M. ♂, ♀.

I am not sure that my reference of these specimens is correct. The thorax has a dark patch on the disc at the base, intersected by two rosy-yellow lines, and more or less bordered with the same colour. Elytra with the nervures costate; the general colour is pale testaceous; the antennæ (basal joint excepted), palpi, tarsi, are fuscous. The pygidium in the male is rounded at the apex and lanceolate, lobed at the sides, the ventral apical segment trilobed, central lobe broad, cleft.

Cratomorphus cossyphinus, Perty Del. An. Art. p. 28.

Bahia; Mus. Brus. ♂.

Also of doubtful identity. Pygidium simply sinuate, ventral plate not lobed at apex. Abdomen with four segments, breast, legs and antennæ dark fuscous, coxæ and middle of sterna paler.

Long. lin. 7.

Cratomorphus dorsalis, Gyll. Schönh. Syn. Ins. iii. App. p. 24?

Antilles; Mus. Brus. ♂?

C. dorsalis (Mots. Etud. ii. p. 34), can hardly be the same as this; it is from Brazil.

♀. Pygidium sinuate at apex, ventral apical plate nearly similar.

Cratomorphus parmatus, n. sp.

Oblongo-ovalis, sordide testaceus, thorace areolis duabus antice diaphanis, disco postice piceo, lineolis duabus parvis flavis, elytris brevibus subscutiformibus.

Long. lin. 7. ♂.

Mas.—Pygidio trilobato, lobis lateralibus medio longitudine fere æqualibus, curvatis; segmento ventrali apicali, utrinque fortiter sinuato.

This little species will easily be distinguished from any other by its short shield-like form, in which it quite resembles certain *Aspidosomæ*. The eyes are particularly large for its size; the abdomen with the dorsal segments fairly lobed.

Cayenne; Mus. Brus.; a single male.

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II. *On some* Coleoptera *from the Hawaiian Islands.*

By D. Sharp.

[Read February 4th, 1880.]

This paper is devoted to a description of the new species of *Staphylinidæ* found by Mr. Blackburn in the Sandwich Islands; they are twenty-nine in number; all are small—most of them minute—insects, but they comprise nevertheless some very interesting forms. It is pretty clear that the autochthonous (to use an expression of Mr. Wollaston's) fauna, in this family comprises two or three groups of rather numerous species, and I anticipate that of these groups other species will be brought to light, if Mr. Blackburn be able, as we all hope he will be, to continue his researches in this isolated insular group.

Falagria currax, n. sp. Variegata, nitidula, subtiliter punctulata; antennis sat elongatis rufo-obscuris, basi apiceque testaceis; capite thoraceque rufescentibus, subtilissime punctulatis, hoc profunde canaliculato; elytris fuscis, humeris apiceque testaceis; abdomine nigricante, segmentis basalibus testaceis; pedibus fusco-testaceis. Long. corp. extens. 3 mm.

Antennæ 1⅛ mm. long, being rather longer than head and thorax, the three or four basal joints yellow, the following ones dusky-red, the apical one or two again yellowish; joints 8—10 each not quite so long as broad. Head reddish, shining and almost impunctate, and destitute of fovea or channel. Thorax of the same colour as the head, shining and almost impunctate, scarcely so broad as the head, very deeply channelled along the middle. Elytra rather short, of an infuscate yellow colour, with the base (especially at the shoulders) and the hind margin paler yellow; they are shining, their punctuation being very fine and indistinct; they have an impression or fovea on the suture immediately behind the scutellum; the scutellum itself is reddish and destitute of channel or carina. The hind body is black, with the basal two segments yellowish, the dorsal plates very finely and indistinctly punctured. The elongate and slender

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legs are yellow, the femora infuscate, with their base yellow.

The species is closely allied to *F. flavocincta*, Kr. (Ceylon), and *F. fovea*, Sharp (Japan); it is still closer, however, to an undescribed species found by Mr. Lewis in China, but I think is nevertheless a distinct species: there is also a very closely-allied species in Brazil.

Occurs rarely near the town of Honolulu, and is probably an introduced species.

Tachyusa pumila, n. sp. Parva, depressa, fusco testacea, abdomine nigro-fusca, antennis pedibusque testaceis; subtilissime punctulata et pubescens, subnitida; capite brevi, posterius recte truncato; prothorace margine anteriore rotundato, lateribus versus basin angustatis; abdomine obsolete punctato, segmentis basalibus ad basin transversim depressis. Long. vix. 2 mm.

This little species reminds one by its form of the European *Tachyusa sulcata*, Kies. (Genus *Xenusa*, Rey), but it is not half the size of it. The antennæ are entirely yellow, rather short, the three basal joints about equal *inter se* in length, joints 6—10 each about as long as broad, 11th joint small. Palpi yellow; head transverse, very finely punctured, obscurely depressed along the middle, the hind margin nearly straight. Thorax about as broad as the head, a good deal narrower than the elytra, the front margin a good deal rounded, the front angles completely rounded, the sides from the front angles to the base a good deal narrowed, in front of the base in the middle is a transverse impression; the punctuation, like that of the head, is excessively fine. Elytra longer than the thorax, finely and closely punctured. Hind body distinctly a little broader from the base to near the extremity, the lateral margins coarse, it is very indistinctly punctured, but the basal dorsal segments are rather deeply depressed in front. The legs are yellow, the tarsi quite short.

I have not been able to count the joints of the tarsi of this little insect; allied maritime species are pretty certainly widely distributed throughout the world.

Two specimens have been captured by Mr. Blackburn on the muddy sand about high-water mark at Kahului Bay, Island of Maui.

Diestota plana, n. sp. Depressa, fusca, opaca, anten-

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narum basi fusco-testaceo, pedibus testaceis; prothorace transverso, basin versus angustato, medio depresso; elytris cum thorace fere impunctatis; mesosterno ecarinato. Long. 2 mm.

Antennæ moderately long and stout, scarcely longer than head and thorax, the two or three basal joints of a dirty yellow colour, the rest darker, the 3rd joint is a good deal shorter than the 2nd, 4th joint small, even smaller than the 5th; 5—10 each slightly broader than its predecessor, the 5th being scarcely, the 10th distinctly transverse, 11th moderately long, twice as long as the 10th. Head distinctly narrowed behind the eyes, its anterior part in the middle slightly depressed, and there impunctate, the rest of the upper side, very obsoletely but yet rather coarsely and densely punctured. Thorax just a little narrower than the elytra, transverse, its greatest width in front of the middle, thence a good deal narrowed towards the base, the disc is somewhat flattened or depressed, the surface is very dull, but has no distinct sculpture. The elytra are rather short, but are quite distinctly longer than the thorax, they are quite dull, very densely and obsoletely, scarcely visibly, punctured. Hind body with the basal segments very finely punctured, the apical ones almost impunctate and shining. Legs yellow; tarsi quite short.

This species reminds one greatly of the well-known European *Aleochara plana*, Gyll. (Gen. *Epipeda*, Rey), but it is not half the size of the European insect.

Found very rarely on the mountains near Honolulu; three specimens in the flowers of palm trees, and another at the sap exuding from a freshly-broken palm branch. The two individuals before me show no sexual characters.

Diestota parva, n. sp. Depressa, nigro-fusca, opaca, pedibus testaceis; prothorace fortiter transverso, basin versus leviter angustato; elytris cum thorace fere impunctatis; mesosterno ecarinato. Long. 2 mm.

Antennæ rather short and stout, about as long as head and thorax, the 1st and 2nd joints scarcely so dark in colour as the others, joints 5—10 transverse. Head very dull, very obscurely punctured. Thorax strongly transverse, much shorter than the elytra.

This species is extremely closely allied to the preceding one, but the head and antennæ are shorter, the thorax also is shorter and not impressed on the disc.

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Mr. Blackburn found a small colony of this species among the remains of a decayed tree on the mountains near Honolulu. The two specimens before me are not in good condition, and show no sexual characters, except, perhaps, that the head appears more distinctly punctured in one than it is in the other.

Diestota latifrons, n. sp. Depressa, fusca, opaca, antennarum basi pedibusque rufis; antennis articulis nullis transversis; capite thoraceque fere impunctatis, hoc elytris angustiore basin versus angustato; elytris subtiliter punctatis. Long. fere 3 mm.

Antennæ longer than head and thorax, a little thickened towards the extremity, 3rd joint as long as the 2nd, 4—10 each about as long as broad. Head large, a good deal narrowed behind the prominent eyes, its surface very dull, but without distinct punctuation. Thorax a good deal narrower than the elytra, transverse, but not very strongly so, its greatest width much in front of the middle, thence distinctly narrowed to the base; its surface is very dull, but only very indistinctly punctured. Elytra much longer than the thorax, dull, finely punctured. Hind body scarcely visibly punctured, rather dull, the apical segments a little more shining. Legs red.

This species has the antennæ more elongate than any of the allies, and its middle coxæ are more approximate. The only individual I have seen is, I think, a female. The mesosternum, I believe, is without carina.

Found on Freycinetia, in the mountains of Kauai.

Diestota palpalis, n. sp. Depressa, fusca, opaca, pedibus testaceis, antennis articulis penultimis transversis; capite thoraceque fere impunctatis, hoc basin versus leviter angustato; elytris subtiliter punctatis. Long. fere 3 mm.

Antennæ not longer than head and thorax, 3rd joint not quite so long as 2nd, joints 7—10 transverse. Head rather large, without visible punctuation. Thorax narrower than the elytra, transverse, but not strongly so. Elytra a good deal longer than the thorax, finely punctured. Hind body very sparingly and indistinctly punctured, not nearly so dull as the other parts. Mesosternum without carina; middle coxæ only moderately distant.

The species is very closely allied to the preceding one,

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but is easily distinguished by the shorter antennæ; the middle coxæ also are slightly less approximate, and the space between them is slightly different in its structure.

I have seen but a single individual, which was found on Mauna Loa, Hawaii, at an elevation of about 4,000 feet.

Diestota puncticeps, n. sp. Depressa, nigro-fusca, abdomine paulo dilutiore, opaca, pedibus antennarumque basi testaceis; capite crebre fortiterque punctato; prothorace fortiter transverso, basin versus angustato, crebre fortiter subobsolete punctato; elytris crebre subtiliter punctatis; abdomine segmentis basalibus crebre punctulatis. Long. $2\frac{3}{4}$ mm.

Antennæ rather short and stout, distinctly thicker towards the extremity, the two or three basal joints yellowish, the others darker, 3rd joint slightly shorter than 2nd, 7—10 rather strongly transverse. Head short and broad, coarsely and closely punctured. Thorax distinctly narrower than the elytra, strongly transverse, the greatest width in front of the middle, thence much narrowed to the base, its surface rather closely and coarsely punctured, but the punctures very shallow; elytra much longer than the thorax, rather closely and finely punctured. Hind body more shining than the other parts, the basal segments somewhat closely but indistinctly punctured, the apical segments more sparingly punctured. Legs yellow.

The only individual I have seen does not exhibit any sexual characters and is probably a female; the species is more rufescent in tint than the preceding ones, the head beneath, the sides of the prosternum, and the mesosternum being of a reddish colour; the middle coxæ are rather widely separated, and the mesosternum has very obscure traces of a carina along the middle.

Found by beating in a mountain forest near Honolulu.

Diestota carinata, n. sp. Depressa, nigricans, antennis basi fusco-testaceo, pedibus testaceis; opaca; capite dense, fortiter, fere rugulose, punctato; prothorace transverso, elytris angustiore, dense, rugulose punctato; elytris rugulose subtiliter, punctatis; mesosterno subtiliter carinato. Long. $2\frac{1}{2}$ mm.

Antennæ short, not stout, distinctly thickened towards the extremity, the basal joint infuscate-yellow, the others nearly black, 3rd joint as long as, though more slender

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than 2nd, the penultimate joints distinctly transverse. Head short and broad, densely, deeply and coarsely punctured. Thorax distinctly transverse, narrower than the elytra, a little narrowed towards the base, its surface densely and coarsely punctured. Elytra considerably longer than the thorax, densely and not altogether finely, yet indistinctly, punctured. Hind body slightly but distinctly constricted at the base, its surface dull, obscurely punctured, the lateral margins broad, the pubescence somewhat distinct.

Of this species I have seen only a single female; the punctuation of the upper surface easily distinguishes it from its allies; the middle coxæ are rather widely separated, and the mesosternum is finely carinated along the middle.

Found by beating in a mountain forest near Honolulu.

Diestota rufescens, n. sp. Subdepressa, opaca, rufescens, elytris fuscis, basi rufescente, antennis versus apicem infuscatis; capite thoraceque obsolete punctatis. Long. 3 mm.

Antennæ moderately short, not very stout, distinctly thickened towards the extremity, of a reddish colour, infuscate towards the extremity; 3rd joint a little smaller than 2nd, 4th, but little smaller than the following ones; these are not transverse, the 10th being, in fact, the only one that is distinctly transverse. Head broad and short, very dull, but without any distinct punctuation. Thorax strongly transverse, a good deal narrower than the elytra; its greatest width in front of the middle, thence a good deal narrowed to the base; the surface is very dull, its punctuation extremely fine and indistinct. The elytra are much longer than the thorax, their apical portion is of a smoky or blackish colour, their basal portion reddish, their punctuation is dense and fine, but not so fine as that of the head and thorax. The hind body is rather large and broad, scarcely at all narrowed at the base; it is less dull than the anterior parts, the basal segments are somewhat closely, the apical ones are more sparingly, punctured. The legs are reddish-yellow.

I have seen but a single individual; it is a male, the last dorsal plate terminates on each side in a sharp, slender, slightly-curved tooth, and between these are seven fine short crenulations. The middle coxæ in this species are rather widely separated, but the mesosternum appears destitute of a carina. Although on account of the

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form of the antennæ, and its dull, impunctate head and thorax, this species has some resemblance to *D. latifrons*, it is really very distinct from it, the middle coxæ being widely separated.

Found on Freycinetia, in the mountains of Kauai.

Obs.—As it is doubtful whether these minute Hawaiian *Aleocharini* are correctly associated with the European *Diestota Mayeti*, I give below a brief enumeration of such of their characters as I have been able to observe.

Labial palpi elongate and slender, 2-jointed, projecting beyond the labrum; middle coxæ not contiguous, sometimes rather widely separated, the metasternum advancing far forwards between them, so that of the intercoxal space more than half the length is appropriated by the metasternum. Tarsi short and rather stout, the anterior and middle ones 4-jointed, the hinder ones 5-jointed; tibiæ rather stout, without spines. Antennæ but little elongate; head broad, without neck, but little immersed in the thorax. Thorax narrower than elytra, transverse, narrowed behind.

These insects seem allied to *Epipeda*, Rey, from which they differ, by the elongate and slender labial palpi, and the more widely separated middle coxæ, as well as by the form of the thorax. The form of the mesosternum, and the separation of the middle coxæ are, in fact, intermediate between the two "rameaux," *Diestotates* and *Placusates* of the French author; for, while the mesosternum descends but little between the coxæ in all the species (the character of the *Diestotates*), its apex is truncate in some of the species (as in *Diestotates*), pointed in others, as in *Placusates*. I have not been able to procure the single European insect, *Diestota Mayeti*, for which Rey founded his rameau, but I believe these insects will prove to be really allied to the European insect, though it is not probable they will be really congeneric therewith. Although these Hawaiian insects differ *inter se* in the structure of the intercoxal parts, it would be impossible for me to treat them at present as forming more than one genus, without making three or four genera for them, a course which would be inadvisable, as I have not at present specimens enough for examination and comparison of the details of their structure.

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Phlæopora cingulata, n. sp. Depressa, angustula, parallela, parum nitida, omnium subtilissime punctulata et pubescens, testacea, capite, pectore, elytris, abdominisque cingula, fuscis; antennis incrassatis. Long. 1½ mm.

Antennæ short and stout, much thickened towards the apex, yellow; 3rd joint quite small, 5—10 strongly transverse. Head about as broad as thorax, with the sides and vertex rectangular; it has a rather obscure longitudinal impression along the middle, its punctuation is quite indistinct, but the surface is dull, and its colour is infuscate yellow. Thorax quadrate, parallel-sided, about as broad as the elytra, yellow, dull, punctuation excessively indistinct. Elytra considerably longer than the thorax, of an obscured yellow colour, quite dull. Hind body narrow and parallel, yellow, with an infuscate ring before the apex. Legs yellow.

I have a single individual, which was found under bark near Honolulu.

This and the *P. diluta*, though excessively closely allied, will prove, I think, to be two distinct species. Although very much smaller and more depressed than our European *Phlæoporæ*, they present the characteristic form of their head and thorax; the Hawaiian species depart, however, from the European ones, by their middle coxæ being quite contiguous, and in this respect they agree with the two Australian insects (*P. læviuscula* and *P. gratiosa*) assigned by Fauvel to the genus *Phlæopora;* one of these Australian insects, *P. gratiosa*, is, in fact, in size, form and colour, remarkably intermediate between the European and Hawaiian insects.

Phlæopora diluta, n. sp. Depressa, angustula, parallela, parum nitida, omnium subtilissime punctulata et pubescens, testacea, abdomine ante apicem infuscato; antennis brevibus, sat incrassatis. Long. 1½ mm.

This species is very closely allied to *P. cingulata*, but it is less variegate in colour, and the antennæ are not quite so stout.

The single individual sent by Mr. Blackburn was found in decayed wood in the mountains of Kauai.

Oligota clavicornis, n. sp. Brevis, utrinque attenuata, subtiliter crebre punctulata, subopaca, fuscescens, anten-

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narum basi, pedibus, abdominisque apice testaceis; antennis brevibus, valde clavatis. Long. 1 mm.

Antennæ very short, with a very thick club, yellow, the club appearing darker; 2nd joint elongate and stout; 3rd, 4th and 5th scarcely differing from one another in width, the latter, however, just perceptibly the broader; 6th a little broader than 5th, slightly transverse; 7th strongly transverse, considerably broader than 6th; 8th and 9th very broad, very strongly transverse; 10th very large, as thick as the preceding ones, and as long as the three preceding ones together.

This species, by its form, colour and punctuation, is allied to the European *apicata*, from which it is distinguished by its short antennæ, with very thick club.

A single individual has been sent by Mr. Blackburn, with the information that he found two specimens in straw in Honolulu; the straw was imported from England, but had been lying more than two years; much search has failed to produce any more specimens. The species is so different from any of the indigenous allies of the Hawaiian islands that I believe it to be imported; it is, however, very distinct from any European species, and it is probable that it found its way into the straw from some port touched at on the long voyage between England and Honolulu. The nearest allies I have in my collection to it come from South America (Rio de Janeiro).

Oligota polita, n. sp. Brevis, picea, abdomine, nigricante, antennis palpisque testaceis, pedibus testaceo-obscuris; glabra, nitida. Long. 1¼ mm.

Antennæ pale yellow, stout, scarcely shorter than head, and much thickened towards the extremity; the two basal joints long; 3rd, 4th and 5th scarcely differing *inter se*, each a good deal longer than broad; 6th and 7th each a little stouter than the preceding one, each longer than broad; 8th and 9th also each a little stouter than the preceding one, and broader than long; 10th large, as long as the two preceding ones together. Head much narrower than the thorax. Thorax strongly transverse, a little narrower than the elytra, which are distinctly longer than the thorax. Hind body rather short, scarcely at all narrowed at the base, about as broad as the thorax. Legs obscure yellow, or reddish, rather long, but not slender, the tarsi rather short and stout.

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This species is rather smaller and narrower than our European *O. inflata*, from which it also departs, by its more prominent eyes, the more Gyrophænoid shape of the prothorax, and stouter legs, as well as by its colour and sculpture.

Mr. Blackburn has found two individuals of this species in flowers in the island of Oahu; although the two localities in which they were found are widely separated, in each case the elevation was about 3,000 feet.

Oligota glabra, n. sp. Parum elongata, nigra, nitida, glabra, elytris parcissime punctulatis, antennis palpisque testaceis, pedibus fuscis, abdomine ad basin angustato. Long. 1½ mm.

Antennæ yellow, 1st and 2nd joints elongate, 3rd, 4th and 5th slender, the 3rd rather longer than either of the other two, 6th just a little broader than the preceding one, longer than broad, 7th to 9th each distinctly broader than the preceding one, the 7th about as long as broad, the 9th rather transverse, 10th large, quite as long as the two preceding together.

This species appears to be closely allied to the preceding one, it is a little larger, and the antennæ are rather more elongate. The hind body appears more developed, and owing to the basal segments being narrower than the following ones, is but little retractile. It is a little larger than the European *O. inflata*.

Found rarely by beating trees on Mauna Loa, and Mauna Kea, Hawaii.

Oligota mutanda, n. sp. Sat elongata, nigra nitida, elytris sat crebre punctatis (antennis?); abdomine parallelo quam thorace conspicue angustiore. Long. 1½ mm.

Head rather small, but with the eyes distinct and convex; thorax very strongly transverse, about as broad as the elytra, and closely applied to them, the surface very finely punctured and pubescent. Elytra longer than the thorax, somewhat finely and not closely, quite distinctly punctured. Hind body rather narrow, and nearly parallel, but little broader than the head, and a good deal narrower than the thorax and elytra, rather convex and shining, but finely punctured and with a scanty pubescence, the basal segments rather deeply impressed at the base. Legs rather elongate and slender, nearly black.

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The only individual I have seen of this species is deprived of its antennæ; it is rather more elongate and more convex than *O. inflata*, it is of different form, owing to its narrow hind body, and its legs are rather longer and stouter. From the preceding species it differs by its narrower hind body, punctate surface, and by its more elongate posterior tarsi.

Found by beating trees at an elevation of 4,000 feet on Mauna Loa, Hawaii.

Liophœna gracilipes, n. sp. Sat elongata, convexiuscula, nigra nitida, glabra, elytris parcissime punctulatis, antennis palpis, clypeo, pedibusque testaceis; abdomine ad basin leviter angustato. Long. 2 mm.

Antennæ yellow, pilose, slender, rather short, 1st and 2nd joints rather elongate, 3—7 differing little from one another, the three apical joints subclavate, being distinctly stouter than the preceding ones, but yet not forming a club. Head greatly narrower than the thorax, very shining and impunctate, yellowish in front. Thorax strongly transverse, narrower than the elytra, and at the base closely applied to them; it is quite black, very smooth, shining and impunctate. Elytra rather elongate, black and shining, extremely sparingly punctured. Hind body rather broad, a little narrowed at the base, very indistinctly punctulated, the basal segments transversely impressed at the base. Legs slender, tarsi slender and elongate, yellow, the terminal joint blackish.

Beaten from a nearly dead tree at an elevation of 4,000 feet on Mauna Loa, Hawaii.

Liophœna flaviceps, n. sp. Sat elongata, convexiuscula, nigra nitida, glabra, capite, prothorace anterius, antennis pedibusque flavis; abdomine ad basin leviter angustato. Long. 2¼ mm.

This species is readily distinguished by the pale colour of the head, which extends to the anterior portion of the thorax; it is very closely allied to *L. gracilipes*, but it is a little more elongate, and the hind tarsi are even more slender and elongate than they are in that species.

Found by beating trees on Mauna Loa, Hawaii.

The two species just described have obliged me to propose a new generic name, *Liophœna*, they being so distinct from any *Aleocharini* yet known, that it is impossible to

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mass them in any genus yet established. I subjoin a brief sketch of their characters, from which it is evident that they should be placed near *Oligota*.

Labial palpi elongate, the terminal joint slender, elongate and parallel. Maxillary palpi elongate, their terminal joint about as long as the dilated penultimate one, but remarkably slender and parallel; the penultimate one rather slender, oval. Eyes very convex and prominent. Antennæ 10-jointed, subclavate, loosely articulated. Legs slender and elongate, tarsi 4-jointed, the basal joint of the posterior ones very elongate, quite as long as the three others together. Middle coxæ widely separated; mesosternum not descending so far between them as their extremity, separated from the metasternum by a fine, nearly straight suture.

Myllæna vicina, n. sp. Rufo-obscura, dense subtiliter punctata, subopaca, abdominis apice rufo-testaceo, pedibus testaceis, antennis gracilibus sat elongatis, articulo ultimo dilutiore. Long. corp. extens. $3\frac{1}{4}$ mm.

Of an obscure, dark-red colour, with the extremity of the hind body paler. The antennæ are rather long, a little longer than head and thorax, slender; even the 10th joint distinctly longer than broad. The elytra are almost as long as, and scarcely as broad as the thorax. The legs are yellow. There is a slight but distinct and broad incision at the outer angle of the elytra.

This species is about the size of the European *M. intermedia*, and is extremely similar to it. It is, however, redder in colour, and the parts of the mouth are more porrect, so that the head appears more acuminate in front. These characters approximate it to *M. brevicornis*, from which it is distinguished by its longer and more slender antennæ and the more obscure colour of the anterior parts of the body.

Found on the island of Maui.

Myllæna familiaris, n. sp. Nigra, crebre subtiliter punctata, subnitida, antennis, palpis pedibusque fuscis. Long. corp. extens. $2\frac{1}{2}$ mm.

The antennæ are rather short, not so long as head and thorax, the 10th joint rather broader than long. Thorax about as broad as the elytra, not so long as broad. Elytra just a little longer than the thorax, very slightly excised

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at the outer angle of the hind margin. Hind body black, closely punctured, its exserted setæ short. Legs between black and red in colour, moderately short and stout.

The species is excessively similar to the European *M. minuta;* it is rather larger and blacker, and the punctuation is not so dense and fine, and the surface, therefore, not so dull. It is still closer to *M. gracilis,* but it is blacker than it, and the punctuation is not so dense and fine, and the antennæ are slightly shorter and finer.

Mr. Blackburn finds this by beating trees and flowers in the forests about Honolulu.

Myllæna curtipes, n. sp. Minuta, rufo-fusca, dense subtiliter punctata, subopaca, antennis pedibusque sordide rufis, illis articulo ultimo dilutiore. Long. corp. 2 mm.

Closely allied to *M. familiaris,* but smaller, and reddish in colour, with the antennæ and legs shorter. Also very close to the European *M. minuta,* but more red in colour, not so extremely densely and finely punctured, and with the antennæ and legs a little shorter. The elytra are not longer than, or indeed are scarcely so long as, the thorax, and they have scarcely any excision at their hind angle.

Found in a heap of refuse on Konahuanui, Oahu, at an elevation of about 3,000 feet.

Myllæna discedens, n. sp. Elongata, rufescens, abdomine fuscescente, versus apicem cum segmentorum marginibus posterioribus rufescentibus; capite acuminato-rostrato, oculis debilibus; prothorace magno, convexo, elytris latiore et longiore. Long. corp. extens. $4\frac{3}{4}$ mm.

Antennæ slender and elongate, as long as head and thorax, yellowish, but the middle joints of more obscure colour. Head red, small in comparison to the thorax, with the eyes very minute; the parts of the mouth very porrect, and the maxillary palpi very elongate. Thorax very large and convex, much broader and much longer than the elytra, its hind angles rectangular. Elytra red. Hind body elongate and slender, so that though distinctly narrowed to the apex, it is more linear than in the other species, densely punctured, but the apical segments less closely, the punctuation is rougher than in the other species, and the surface not so dull. Legs yellow; the posterior tarsi elongate, as long as the tibiæ, their basal

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joint elongate, fully as long as the two following together. Apex of middle coxæ scarcely separated from the hind coxæ.

This species is a very distinct and peculiar one, and may probably prove to be sufficiently distinct from the others to form a new genus. The only individual I have seen is in bad condition; it is, according to Mr. Blackburn, an extremely rare insect and is found under decaying logs, near Honolulu, at an elevation of about 1,500 feet.

Pachycorynus discedens, n. sp. Depressus, capite thoraceque piceis, parce punctatis, medio lævigatis, antennis pedibusque testaceis, elytris testaceo-obscuris crebre punctatis, abdomine nigricante, apice ferrugineo, marginibus lateralibus fusco-testaceis. Long. 6—7 mm.

Antennæ reddish-yellow, slender, none of the joints transverse, the basal joint as long as the three or four following ones together. Head quadrate, piceous, with the clypeus more red, coarsely but sparingly punctured, the punctures nearly or altogether wanting along the middle; the oblique groove extending inward from the front anterior margin of the eye is distinct, as well the parallel grooves at the insertion of the antennæ. Thorax almost as broad as the elytra, distinctly narrowed behind, with a series of punctures on each side of the middle, extending from the base to the apex, and with irregularly-placed lateral punctures. Elytra scarcely longer than the thorax, of a sordid or infuscate yellow colour, regularly and somewhat closely and distinctly punctured. Hind body blackish, passing into red at the extremity, and with the elevated lateral margins obscurely yellow. It is sparingly punctured, the punctuation wanting along the middle. The legs are short, the tarsi quite short and stout.

This species differs from the East Indian and Papuan *P. dimidiatus*, by the presence of distinct oblique lateral grooves on the head, and by its middle coxæ being approximate, though not contiguous. It must be considered a still more aberrant form of *Xantholinidæ* than the insect alluded to, but I have not thought it advisable to give it a distinct generic name at present.

Found by Mr. Blackburn under bark in a forest near Honolulu.

Oxytelus advena, n. sp. Rufescens, capite, elytris

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versus apicem, abdominis apice, antennisque extrorsum fuscis; capite brevi, crebre punctato, clypeo nitido, fere impunctato, mandibulis sat elongatis; thorace elytrisque sat fortiter punctatis, illo medio parum distincte trisulcato. Long. 2½—3 mm.

Antennæ moderately long, blackish, yellow at the base, the penultimate five joints transverse. Head blackish, shining, rather strongly punctured, the punctuation in the male strigose, the clypeus is very distinctly marked off, and is smooth and shining. Thorax strongly transverse, reddish-yellow, shining, rather strongly punctured, the three grooves along the middle approximate and rather indistinct. Elytra a good deal longer than the thorax, blackish towards the extremity, reddish at the base, rather coarsely strigose-punctate, somewhat shining. Hind body almost without sculpture.

This species is closely allied to *O. rufus*, Kr. (Ceylon), but that species is entirely reddish-yellow, and has the antennæ rather shorter, and with a thicker club.

Occurs in the low grounds of Oahu, but Mr. Blackburn does not recollect seeing it in the other islands. I believe it to be an introduced species.

Trogophlæus senilis, n. sp. Elongatus, angustulus, fusco-niger, antennis rufis, pedibus testaceis, omnium densissime subtilissimeque punctatus brevissimeque pubescens, opacus; prothorace angulis anterioribus, subprominulis, acutis, dorso obsolete bi-impresso, lateribus versus basin fortiter angustatis. Long. 3 mm.

About as long as *T. bilineatus*, Steph., but narrower. Antennæ rather long and stout, of a reddish colour, a little thickened towards the apex, but without club, none of the joints transverse. Head rather small, narrower than the thorax, palpi reddish. Thorax a little narrower than the elytra, nearly as long as broad, the front angles distinct and acute, from the front angles to about one-third of the distance towards the base, the width considerably increases, and then rapidly diminishes towards the base, so that the sides in front of the middle have a subangulate appearance; the disc is scarcely visibly bi-impressed, and the surface is quite dull, on account of an extremely dense, fine, invisible punctuation. Elytra rather short, but a little longer than the thorax, very densely and finely punctured, but the punctuation not

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quite so invisible as that of the thorax. Hind body rather elongate, a little dilated from the base to near the apex. Legs clear yellow.

Common in Oahu. I believe it to be an introduced species; I have, indeed, an extremely closely-allied species in my collection from Brazil.

Trogophlæus fontinalis, n. sp. Capite abdomineque nigricantibus, thorace elytrisque sanguineo-obscuris, antennis rufis, basi dilutiore, pedibus testaceis, angustulus, sat elongatus, dense subtilissimeque punctatus, subopacus, prothorace dorso obsolete bi-impresso, lateribus rotundatis, basin versus angustatis. Long. $2\frac{1}{2}$ mm.

Similar in size and form to *T. elongatulus*, Er. Antennæ moderately long, distinctly thickened towards the apex, but scarcely clavate, the three terminal joints are however perceptibly broader than the preceding ones, the 10th joint scarcely shorter than long. Head rather narrower than the thorax, black. Thorax narrower than the elytra, rather broader than long, truncate in front, without distinct angles, the greatest width is much in front of the middle, and thence it is a good deal narrowed towards the base, the surface is dull and is excessively finely and densely punctured, and excessively indistinctly bi-impressed. Elytra a little longer than the thorax, and of a red colour a little clearer than it, very densely and finely punctured. Hind body rather elongate and narrow, a little dilated from the base to near the apex, densely and finely punctured, but a little shining. Legs yellow.

Found on the margin of running water in the mountains of Oahu.

Trogophlæus abdominalis, n. sp. Similis *T. exigui*, Er., sed major et magis elongatus; niger, opacus, densissime subtilissimeque punctatus, subopacus; antennarum basi, pedibusque sordide testaceis. Long. $2\frac{1}{3}$ mm.

Antennæ moderately long and stout, with the three apical joints a little thicker than the others, the 9th and 10th rather transverse. Head rather narrow but nearly as broad as the thorax. Thorax a good deal narrower than the elytra, as long as broad, the front angles very indistinct and depressed, transversely convex, the greatest width in front of the middle, thence a good deal narrowed to the base, the surface with excessively dense and fine,

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invisible punctuation and pubescence, and excessively obsoletely impressed. Elytra rather longer than the thorax, very densely and finely punctured and pubescent, but not so extremely finely as the thorax. Hind body rather elongate, slightly dilated from the base to near the apex, densely and finely punctured. Legs dirty yellow.

Although the head and thorax of this species give it a great resemblance to *T. exiguus*, the elytra and hind body are more after the pattern of *T. elongatulus*. The antennæ are considerably longer than in *T. exiguus*.

Found in the salt marshes of Oahu.

Glyptoma Blackburni, n. sp. Nigricans, opacus, antennis pedibusque rufis, capite thoraceque longitudinaliter strigulosis, fere sine lineis elevatis, hoc vix transverso; elytris thorace conspicue longioribus, lineis elevatis rectis fere integris; abdomine per-opaco, segmentorum marginibus posterioribus rufescentibus. Long. $3\frac{2}{3}$ mm.

Antennæ much shorter than head and thorax; joints 8—10 strongly transverse; 7th scarcely transverse, but slightly broader than the preceding one. Head distinctly strigulose, but without any distinct elevated lines. Thorax a little broader than long, a little narrower than the elytra, the sides from the front to near the base nearly straight, a little in front of the base they become somewhat narrowed, the hind angles rectangular; the surface is longitudinally strigose, and slightly uneven. The elytra are distinctly longer than the thorax, and have five or six somewhat fine elevated lines extending for nearly their whole length.

This species has been found by Mr. Blackburn in several of the islands.

Glyptoma brevipenne, n. sp. Rufo-obscurus, opacus, capite thoraceque longitudinaliter strigulosis, fere sine lineis elevatis, hoc subtransverso; elytris thoracis fere longitudine, lineis elevatis rectis fere integris; abdomine per-opaco. Long. $3\frac{2}{3}$ mm.

This species is very closely allied to *G. Blackburni* in all points except that it has the elytra very much shorter.

Found rarely in the mountains of Oahu.

Lispinodes explicandus, n. sp. Valde depressus, linearis, subglaber, parum nitidus, fusco-testaceus, prothorace

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rufescente, antennarum basi pedibusque testaceis; femoribus crassis, tibiis anterioribus curvatis. Long. $2\frac{3}{4}$ mm.

Although the surface is nearly destitute of sculpture and pubescence, it is but little shining; the antennæ are rather short, the basal joint short and much concealed, the five following ones short and slender, 7—10 not very stout, but distinctly transverse, differing little from one another. Head rather narrower than thorax, smooth, dull, without sculpture. Thorax rather broader than long, narrower than the elytra, the sides rounded and narrowed behind, the hind angles very indistinct, the surface very sparingly and indistinctly punctured, without impressions. Elytra much longer than the thorax, very sparingly punctate, with a very distinct sutural stria. Hind body elongate, dull. Legs yellow, the femora thick, but flattened.

Found rarely, under bark, on the higher mountains of Oahu.

The structural characters of this new genus follow :—

Sculpture and form of *Lispinus*, but more depressed. Head small, not margined in front, and without antennal tubercles, slightly constricted behind the eyes so as to form a thick neck. Thorax with the base slightly emarginate. Hind body without lateral margins, shaped just as in *Lispinus*, but the terminal segment ends in two very obscure styles. Parts of the mouth, including the mandibles, very small; the sutures of the undersurface of the head are quite effaced. Prosternum in front of coxæ large; anterior coxæ not prominent, contiguous, not separated by any process of the prosternum. Middle coxæ globose, very nearly contiguous. Femora very thick; tibiæ slender, without spines or hairs. Tarsi very small, three-jointed, the two basal joints very short.

Although this insect has at first sight quite the appearance of the flatter and smaller species of *Lispinus*, it is not really allied to them. Its affinities are undoubtedly with *Glyptoma*, Er. (*Thoraxophorus*, Motsch.), although it differs totally therefrom by the absence of sculpture and by the depressed form. Its nearest known ally is, no doubt, the Austro-Malasian *Thoracophorus crenicollis*, Fauv., but it is not at all probable that the two can be placed in one genus. Fauvel has quite correctly stated that a new genus will require to be founded for his species.

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III. *On synonyms of Heterocerous* Lepidoptera. By Arthur G. Butler.

[Read March 3rd, 1880.]

In the hope that the following notes on synonyms may prove useful to Lepidopterists I venture to publish them; and, much as I must deprecate the want of care which has been the cause of their creation, I nevertheless am willing to believe that the authors who have thus sinned will in future take more pains than they have hitherto done to prevent a repetition of the error.

Whilst correcting the specific names applied for a second time to the same insect, I think it will be advisable to help one writer whom I here criticise to an identification of the genera to which his other species are referable. As it is not conceivable that any Lepidopterist now living can honestly desire to restore the nomenclature to the simplicity of almost Linnean times, and as nevertheless species have been referred by Herr Snellen to the typical genera of families (such as *Euproctis*, *Limacodes*, &c.), when the insects described are manifestly not closely allied to these genera, I can only suppose that this Entomologist is waiting for the identifications in order to classify them in their proper groups.

At present I regret that I have only time to note the synonyms in one of Herr Snellen's most recent memoirs, I refer to that on the *Lepidoptera* of Celebes (Part II.), in the Tijdschrift voor Entomologie for 1879, pp. 61—126.

Nyctemera latistriga, Snellen (Pl. VI. fig. 5), is probably *N. lacticinia* of Cramer, and certainly not *N. latistriga* of Walker.

Nyctemera abraxata, Snellen (fig. 6), is *Pitasila guttulosa* of Walker.

Chalcosia appendiculata is a *Heteropan*, scarcely differing from *H. scintillans* of Walker.

Aganais vitessoides is a *Hypsa* close to *H. silvandra* of Cramer.

Digama piepersiana is probably the female of *D. marmorea*.

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Lithosia chryseola is *Capissa sambala* of Moore; Herr Snellen states that he has it from Java as well as from the Celebes.

Lithosia xantholoma is nearly allied to *L. replana* ♀ of Lewin. I have not yet been able to determine the genus of this species.

Paidia creatina, Setina nigrocincta, S. calligenioides, Hypocrita meander and *Pitane rectilinea,* are all species of *Miltochrista. P. creatina* and *H. meander* being referable to the typical section of the genus, *P. rectilinea* to the section named *Sesapa,* and the two others to the section *Barsine.*

Hypocrita (!) *flavicollis* is a *Chalcosiid,* referable to the genus *Scaptesyle,* and nearly allied to *S. calida* of Walker.

I can find no difference between *Earias limbana* and *E. fervida* of Walker.

Amerila piepersii is *Pelochyta arthus-bertrandi* of Guérin.

Orgyia ludekingii is an *Enome* close to *E. ampla* of Walker.

I can find no difference whatever between the figure of *Lælia subrufa* and the male of *L. cœnosa,* yet in specimens which geographically are so widely separated it is probable that some local difference does exist.

L. saturnioides not only is not a *Lælia,* but does not belong even to an allied genus; in pattern it somewhat resembles *Geodena,* but probably is a new genus.

Euproctis Moorei is represented by three species of *Artaxa,* fig. 8 being scarcely distinct from *A. dissimilis* of Java; fig. 9 being allied to *A. linta,* and fig. 10 to *A. subnotata.*

Euproctis flavipennis, although exactly like the female of *A. varians* of Walker, is probably distinct, since one is Indian and the other from the Celebes.

Euproctis discophora is a *Chærotriche,* an allied species, occurs in Borneo.

Limacodes chlorostigma is a *Parasa,* although in coloration it greatly resembles *Euclea monitor* of Packard.

Limacodes circinatus is an *Eloasa,* close to *E. congrua* of Walker.

L. catenatus appears to be an *Aphendala,* but it would require careful examination to be certain.

L. albiguttatus is a *Miresa,* allied to *M. castaneipars* of Moore.

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The following are notes upon a short paper by Herr Mœschler in the Stettin Entomologische Zeitung for 1872:—

Heterusia signata is *H. edocla* of Doubleday.

H. trimacula is *H. scintillans* of Herrich-Schäffer.

H. flavomaculata is *Soritia pulchella*, ♂, of Kollar.

H. octopunctata is *Soritia sexpunctata*, ♀ var. of Walker.

Phalanna amœna is probably African, being evidently nearly allied to *Euchromia africana*, Butler, but apparently differing in its yellow tegulæ, the abdomen snow-white at base, the abdominal band yellow and wider, the base of primaries occupied by two sagittate spots, of which the lower one is large and carmine, whilst the upper one is yellow.

Gnophria quadrimaculata is *Vamuna remelana*, ♀, of Moore.

Gnophria (*Œonistis*) *strigata* is *Chrysorabdia viridata*, ♀, of Moore.

Lithosia colon appears to be referable to Moore's genus *Prabhasa*.

Ægocera fimbria is Walker's *Æ. fervida*, and comes only from South Africa, which fact throws considerable doubt upon the accuracy of the locality for *Phalanna amœna*, described in the same paper.

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IV. *Descriptions of* Cetoniidæ *and* Cerambycidæ *from Madagascar.* By Chas. O. Waterhouse.

[Read March 3rd, 1880.]

The species described in this paper have recently been received by the British Museum from Fianarantsoa. They were collected by the Rev. Wm. Deans Cowan, to whom we are already much indebted for many novelties. Among other rarities is a single specimen of the remarkable genus of *Elateridæ*, described by Dr. Candèze (Cist. Ent. ii. 1879, p. 485) as *Morostoma*, having the palpi as long as the antennæ. It differs from the type specimen in being much larger, 9 lines in length, and in having the legs concolorous with the body; it is probably a female.

CETONIIDÆ.

Celidota splendens, n. sp.

Viridi-aurea, nitida; thorace (marginibus exceptis) scutello, elytrisque cupreo-rufis, tibiis cupreo-tinctis, pygidio sat crebre punctato.

Long. 13 lin.

Clypeus rather thickly and strongly punctured, a little wider in front than at the base, transversely impressed before the anterior margin, which is slightly reflexed, the angles obtuse. Thorax deep coppery-red (except at the sides), very finely coriaceous, and moderately thickly and distinctly punctured, especially towards the sides; the base is sinuate in the middle; the posterior angles are obtusely rounded. Scutellum nearly in the form of an equilateral triangle, moderately thickly punctured at the sides. Elytra broad at the shoulders (where there is a black spot), relatively more narrowed behind than in *C. Stephensii*, leaving the margins of the abdomen visible from above, deep coppery-red, extremely finely coriaceous, and not very shining, thickly and very dis-

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tinctly punctured all over, with no costæ nor striæ. Pygidium gently convex, moderately thickly and distinctly punctured, very slightly impressed on each side at the margin. Mesosternal process transverse, a little angular in the middle, evenly arcuate in front. The segmentations of the abdomen margined with deep blue. Anterior tibiæ with two teeth.

Coptomia rufo-varia, n. sp.

C. prasinæ affinis, viridis, thorace elytrisque rufo-tinctis; elytris fortiter striatis, pygidio leviter convexo, haud impresso, transversim striolato. ♀.

Long. 9 lin.

Very close to *C. prasina*, but much narrower, and pale yellowish-green, with the thorax and especially the scutellum and dorsal region of the elytra coppery-red. Head and thorax less strongly punctured than in *prasina*. Scutellum more acuminate. Elytra deeply striated, but the punctures in the striæ are scarcely visible even with a magnifying power, and there is no fine line at the bottom of the stria, as is usual in *prasina*; the first four interstices are straight and equally broad; the fifth and sixth striæ are very strongly punctured, straighter, and nearly of equal length.

CERAMBYCIDÆ.

Opsamates purpureipennis, n. sp.

Niger, nitidus; antennis articulis 3°—11^{um} piceis, breviter pilosis, thorace crebre fortiter punctato, lineâ medianâ lævi, lateribus tuberculo parvo ante medium, elytris purpureis, parum convexis, fortiter discrete punctatis, singulis costis tribus obtusis, humeris apiceque virescentibus. ♀.

Long. 13 lin.

Head with a longitudinal channel, and with some strong punctures on the antennal tubercles. Antennæ short, not reaching to the middle of the elytra, finely pilose, the basal joint strongly punctured, the punctuation of the 2nd, 3rd and 4th joints is less strong, that of the following joints is finer and closer, the 3rd and 4th joints are subcylindrical, the 5th, 6th and 7th are rather wider at their apex. The thorax is one fifth broader than long,

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convex, covered with large close punctures, which leave a more or less complete smooth mesial line; on each side of the disk there is a very slight tumour; there is a nearly rectangular prominence at the side in front (obtuse at its apex), and rather before the middle of the side there is a small obtuse tubercle; the base is strongly margined, and is slightly sinuate on each side. Scutellum smooth. Elytra about one quarter broader than the widest part of the thorax, parallel (or perhaps a little wider behind), very obtuse at the apex, with strong punctures not very closely placed over the surface; each elytron has three obtuse costæ, none of which reach the apex. The metasternum is thickly and strongly punctured; the abdomen rather less thickly but still more strongly punctured. The legs are more or less piceous, sparingly punctured, and sparingly pilose. The prosternum is very strongly transversely rugulose.

In my endeavour to determine the position of this curious insect, by the help of the "Genera des Coléoptères," I came to the conclusion that it should be placed after the *Metopocœlinæ*, and in comparing it with my genus *Opsamates* (Tr. Ent. Soc. 1879, p. 264), also from Madagascar, which I had placed in that position, I have not seen sufficient reason for separating it as a distinct genus, although its appearance is very different. The antennæ, however, are shorter, and scarcely at all dentate; the anterior coxæ are not quite so approximate, and the thorax has no dorsal tubercles, beyond these there are two lines of strong punctures besides the marginal one; the apex is finely striolate as in *prasina*. The pygidium is not impressed on each side of the disk, but is evenly convex, and although closely striolated, is not so closely as in *prasina*.

Hab.—Fianarantsoa (Rev. Wm. Deans Cowan).

Leptocera flavovittata, n. sp.

Nigra, subopaca; antennarum articulis 3°—11^{um} pedibusque flavescentibus, thorace subcylindrico, dense punctato, elytris cyaneis, singulis vittâ latâ flavescenti haud ad apicem attingenti.

Long. 8 lin.

Head very strongly punctured between the eyes. Thorax a little longer than broad, subcylindrical, a very little narrowed in front and behind, densely and rather

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strongly punctured. Elytra deep blue, rather thickly and very distinctly punctured; each elytron with a pitchy-yellow stripe down the middle, extending to the shoulder at the base, narrowed posteriorly, and not reaching to the apex; the apex truncate, the external angle with a very small tooth. Abdomen smooth, with a few strong punctures scattered here and there.

Hab.—Fianarantsoa.

This species is closely allied to *C. humeralis*.

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Long. 13 lin.

Head with a longitudinal channel, and with some strong punctures on the antennal tubercles. Antennæ

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short, not reaching to the middle of the elytra, finely pilose, the basal joint strongly punctured; the punctuation of the 2nd, 3rd and 4th joints is less strong, that of the following joints is finer and closer, the 3rd and 4th joints are subcylindrical, the 5th 6th and 7th are rather wider at their apex. The thorax is one-fifth broader than long, convex, covered with large close punctures, which leave a more or less complete smooth mesial line; on each side of the disk there is a very slight tumour; there is a nearly rectangular prominence at the side in front (obtuse at its apex), and rather before the middle of the side there is a small obtuse tubercle; the base is strongly margined, and is slightly sinuate on each side. Scutellum smooth. Elytra about one quarter broader than the widest part of the thorax, parallel (or perhaps a little wider behind), very obtuse at the apex, with strong punctures not very closely placed over the surface; each elytron has three obtuse costæ, none of which reach the apex. The metasternum is thickly and strongly punctured; the abdomen rather less thickly but still more strongly punctured. The legs are more or less piceous, sparingly punctured, and sparingly pilose. The prosternum is very strongly transversely rugulose.

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Hab.—Fianarantsoa.

This species is closely allied to *C. humeralis*.

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V. *On the Structure of the* Lampyridæ, *with reference to their Phosphorescence.* By the Rev. H. S. Gorham.

[Read March 3rd, 1880.]

The interest taken by the members of the Society who were present when I rather briefly stated some morphological observations I had made while studying the *Lampyridæ*, was so much greater than I had anticipated, that I think it worth while to lay before the Society a fuller summary of those facts, and venture to restate in a rather fuller form, and, if I can, more clearly, the conclusions at which I arrived.

I think it will be admitted that generalisations founded on a limited number of phenomena are only misguiding, and have no sure basis, while in those founded on a large number of facts, some cases are sure to be found, which may at first seem adverse to the conclusion which we are at last compelled to adopt.

This has been the case here. There are examples, such as the non-luminous species, which I do not profess to say more about than that they do not invalidate the general conclusion at which I arrive, which is that the sexual instinct has played a large part in moulding the external structure of this group of beetles, and that it is to that we may look for an adequate explanation of the wonderful development of phosphorescent light, though perhaps not to its origin.

In the first place, then, it is to be observed that all the species of this family do not possess the luminous faculty in equal degree; but that on the contrary, while some are highly luminous in both sexes, some are only highly so in the female, some are not luminous in either sex, and some (though this appears rather doubtful) are luminous in the males, and not so, or much less so, in the female.

The part which this faculty of emitting light plays in the economy of nature has been long and earnestly debated. The most general view, and therefore one to which I lay no claim for originality, but which my observations tend to confirm, is that it serves as a beacon to attract the male to

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the female; but I believe this to be the case only in a special sense in those species which do not assemble, and especially in those in which the females are incapable of flight. In other cases I believe that *both* sexes are attracted, and enabled by this means to assemble at night for their union. These inferences are drawn from the consideration of the relative development of the eyes, together with what is known of the habits of the various species.

The eyes of the *Lampyridæ* are, I find, developed in magnitude according to the amount of luminosity of the species considered. And the other parts which I have taken account of, together with these, are the antennæ, of which there is a very great diversity, both between the sexes, and in the genera;—the elytra, which are also subject to sexual and generic limitations, and finally the size of the abdomen in the female.

The last mentioned is no doubt, as in other apterous females, the result of an increased production of *ova*. These are, I believe, in the *Lampyridæ* laid on roots, and other substances near the ground, where the young larvæ will at once be likely to meet with their molluscan diet. The greater the tendency to produce *ova* in abundance, the more sluggish the females would become, and hence females once capable of flight would lose the use of their wings, and the *usefulness* of the light to attract their more volatile partners would be greater than ever. This I believe to be the explanation of the fact that the highest degree of light, or at any rate the greatest disproportion in the amount shown by the sexes, is to be found in those species which have apterous females, and together with this the greatest development of eye in the male. We will now consider the case of those species in which both sexes are winged, and in which both are luminous, and in probably nearly equal degree. Such are, I have reason to think, by far the large proportion of the whole number of existing species. In this case the power of emitting light would be obviously useful in attracting both sexes to assemble in swarms, and it does not militate against this supposition that in many species the males should possess this faculty in the higher degree. It might be anticipated that if the female has to be guided to the rendezvous of the species by this effect, the eyes in that sex would not be inferior to those of the male; and such is the fact. To save repetition here I will only instance one well-known case, viz., that of the European and Eastern genus

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Luciola. Here both sexes fly, both are luminous, and both have largely developed powerful eyes.

Neither of these sections, however, comprise those species which are generally regarded as most typical of the family, the largest, and those which appear on the whole to have all their parts most highly specialised, and which, therefore, we place at the head of a systematic list, such as the genera *Lamprocera* and *Cladodes*. It is rather remarkable that in these genera the light-emitting faculty has not been developed in the same proportion as the rest of the organs have, and that while one of these, viz., the eyes, are also reduced in a direct ratio with the light, and are small and uniform in both sexes, another organ, the antennæ, is developed in inverse ratio as the phosphorescence is diminished. I do not here speak of mere length, or redundancy in the number of joints, which are more usual in very simple and primitive forms of the organ, such as we see in *Blatta*, but of a high degree of specialisation, testified by large lamellar plates, or pectination. Whether the eye is developed at the expense of the antenna, and is so to speak the receptacle of all the vital forces of the head, or whether the antenna supplements the loss of the other organ of sense, and is useful in detecting the presence of the female, I only see one fact in evidence, which is that this plumosity of the antennæ, in one case, and this enormous development of the eye in the other, are *usually* sexual characters predominating in the male, but sometimes found in both sexes.

I now offer some evidence in support of my view. The species I have selected to illustrate the subject I have arranged in three groups.

i. Species with plumose antennæ, small or moderate eyes, both sexes winged, light-emitting surface confined to one or more small spots. Genera exhibited *Lamprocera*,—*L. Latreillei* ♂ ♀. The male only is luminous, and apparently only slightly so. *Cladodes*,—*C. lamellicornis*. *C. plumosa*, Gorh. The sexes are as yet undistinguishable. *Vesta*,—*V. saturnalis*, Gorh. *Lucidota*,—*L. flabellicornis*, *Phœnolis*,—*P. plumosa*, Gorh. *Megalophthalmus*, *M. Guatemalæ*, Gorh. Of this genus it is noticeable that Lacordaire remarks the name is unfortunate, as the eyes are *not* larger than is usual in this family.

ii. Species in which both sexes are winged; light

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emitted considerable, sometimes greater in the ♀. Eyes large, sometimes excessive. Antennæ simple, usually filiform. Genera,—*Cratomorphus*,—*C. giganteus*, *C. fuscipennis*. *Lucernula*,—*L. fenestrata*, *Aspidosoma*,—*A. laterale* ♂. *A. ægrotum*, Gorh. ♂ ♀. *Luciola*,—*L. italica*; *L. lusitanica*; *L. vespertina*. *Photuris*,—*P. pennsylvanica*.

iii. Species in which the female is apterous or with rudimentary wings; light emitted often very great in the female, and often only rudimentary traces of it in the male. Antennæ usually rudimentary. Eyes large in the male, often excessively so, occupying nearly the whole head. Genera,—*Pleotomus*,—*P. palleus*, ♂ ♀; *Lamprophorus nepalensis* ♂; *Microphotus*, M. n. sp. *Lampyris*,—*L. noctiluca* ♂ ♀; *L. mauritanica* ♂ ♀; L. sp.? Africa; *Lamprorhiza*,—*L. Delarouzei* ♂ ♀.

iv. Three abnormal genera which do not seem to form cases in point. *Alychnus*,—*A. xanthorrhaphus* ♂ ♀. This being quite non-luminous appears only to offer negative evidence. The eyes are not developed. *Dioptoma*,—*D. Adamsi*,—the eyes are enormous, but I do not know anything about the luminosity. *Amythetes*,—*A. fastigiata*. The antennæ are plumose, and both sexes I believe luminous, but the insect is quite abnormal; the antennæ are redundant in the number of joints and the plumosity very soft and fine. I should consider them simple rather than specialised.

With regard to the power of withdrawing the light proved I believe to exist in these insects, whether suddenly and intermittently as in the instance of the *Luciola*, or gradually as I have observed in *L. noctiluca*, the explanation is I think that the external white vitreous-looking parts are only diaphanous, not themselves the source of the light which is within the body of the insect and can be pressed against these windows, or retired from them at its pleasure.

I think Newport observed that these segments in the female of *L. noctiluca* were detached from the internal parts on dissecting them. The circumstance of the *Luciolas* thus flashing in unison would on this hypothesis easily be accounted for, by any exciting cause, such as the arrival in the swarm of a fresh female, or the gusts of air, which affected them all at one time. And the comparative hardness of the body in this genus seems to favour the idea that this may be really the case.

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I trust I shall not have been too prolix or to have dwelt longer on the subject than it deserved. I have for some years taken the greatest interest in the distinctions in the sexes of insects, and the apparent cause of these diversities, or ends gained by their means, and you will see that the theory of their gradual development forms part of my suggestion.

We do not find here the feet with widened tarsi, or patellated front feet with roughened elytra in the female, as in the Carabidæ and Water-beetles, nor prehensile bent tibiae in the male as in Necrophaga, Weevils, and many other groups, nor teeth developed on the tibiae, nor claspers to the abdomen, nor the enormous jaws of Lucanus by which, as I have observed, he can throw a rival as an athlete does his antagonist, nor fighting horns as in many Coleoptera. But what we do find is a simple natural variation, taken advantage of with such success, that it has proved sufficient to mould at least two other organs by its application to the insect's necessities : one the eye in the direction of developing its power, the other the antenna by correlation in the opposite direction of reducing it to a rudiment. The light of *Lampyridæ*, which *may* have originated with their molluscan diet, has been sufficient to develop the most perfect eyes I have noticed in Coleoptera: while it has rendered unnecessary and checked the original tendency to plumosity in the organ of touch, wherever it has been taken advantage of in any considerable degree.

Among the numberless variations that arise naturally in the animal and vegetable kingdom, man is ever availing himself of those he desires, and is, to a great extent, able to render those that are useful permanent, and to check those that are not so, and it appears to me that I have shown you an example where nature has proceeded in the same way.

Our Vice-President, in his address, exhorted us in our papers to bring our attention to bear on the morphological characters and habits of the creatures we study. If I have relieved the monotony of the technical descriptions, and mere classification of these beetles, which the Society has received so favourably, and taken a step in the direction he indicated, I shall feel I have not wasted your time, and shall be recompensed if the discussion of the subject brings out any new facts for its elucidation.

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VI. *Notes on the Coloration and Development of* Insects.

By P. Cameron.

[Read 7th April, 1880.]

I. On the Markings on the Larvæ of *Smerinthus*.

Last autumn I made an observation which may possibly throw some light on the use of the reddish-brown marks along the sides of the larvæ of *Smerinthus*. My attention was attracted to a small poplar (*Populus nigra*) whose leaves were very much affected with the small dark blotches caused by the fungus *Melampsora populina*, Lev. When examining these, I noticed that some of the blotches appeared to be of a brighter and redder tint. On pulling a leaf down which bore these differently-coloured markings, I found, somewhat to my astonishment, that they were not fungi, but the markings along the sides of a caterpillar of *S. populi*, which I had not observed before. The question then occurred to me : Might not the markings on the caterpillar have been acquired in imitation of the fungi, so as to give it an additional means of protection, in conjunction with the green colour of its body, in imitation of the green colour of the leaf ? To test this, the caterpillar was put back again on the tree, and the effect noticed. No doubt, looking at it close at hand, the larva was readily seen, for besides the slight difference in the colour of the lateral marks and the fungi (as already explained), the colour of the body was much brighter than the leaves, which were then (the end of September) beginning to fade ; but, looked at from a distance of several feet, the caterpillar was certainly very difficult to see, and undoubtedly it seemed to me that the similarity of the spots to the fungi added not a little to hide it. Several other caterpillars were found on neighbouring trees (likewise infested with fungi), and the examination of these served to confirm my first impression of the usefulness of the marks in hiding the larva in the circumstances in which it lived. The markings on the three species of *Smerinthus* are variable, and may be entirely absent. Mr. Boscher, for instance (*Proc. Ent. Soc.*, p. xliv., 1878), describes two forms of

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the larva of *S. ocellatus*—one feeding on *Salix triandra*, without markings, and another on *Salix viminalis*, with a double row along the side. We can scarcely suppose that the marks serve no useful purpose; and we have in the case of *Deilephila Hippophaes* a very good illustration of similar marks simulating objects—the berries—found on the food-plant. There is another circumstance which favours my view, the circumstance, namely, that the three principal food-plants of our species of *Smerinthus*—*Tilia*, poplars, and willows—are much infested on the leaves with fungi (as the poplar), or, as with all three, with mites (*Phytopus*), which form on the leaves little galls of from 1 to 3″ in length, and usually of a brownish-red colour; while they are, like the fungi, very common, and have a wide distribution. On a willow (*Salix aurita*) close to where I discovered the caterpillars, I found many mite-galls on its leaves, and compared them with the markings in the caterpillar. Many were larger, and many smaller, while the colour was scarcely so bright in most cases, but still at a distance of a yard or two the resemblance was considerable, and could only be detected by a practised eye. I do not know if the spotted caterpillars are found only on infested trees, or the contrary; what I contend for is, that these and similar excrescences, being so common on the food-plants (and indeed on most plants near those frequented by the larvæ), the reddish markings serve to protect them.

In the above-mentioned caterpillar of *S. populi*, the red spots were fully larger than those in Weismann's figure of *Deilephila Hippophaes*,* and they were the same in number (6); the spiracles too were surrounded with red; but these red blotches, though more numerous, were scarcely so large as those on the upper row, although conspicuous enough.

My observations have shown too, I think, that they do aid in concealing the larva on an infested tree. The fact of the spots appearing late in life may be owing to the caterpillar's increased size rendering it more conspicuous than it was when younger, and, consequently, standing more in need of additional means to aid concealment. It may be added that *Hippophae rhamnoides*, the food-plant of *Deilephil a Hippophaes*, has a *Phytopus*† attached to it;

* Descendenz—Theorie, ii., pl. iv., f. 59.

† cf. Rudow. *Pflanzen-gallen Norddeutschlands*, p. 173.

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and if its galls be like those on willows, &c., they would have, at least, a general resemblance to the reddish markings on the caterpillar, and the similarity between the two may serve to hide the caterpillar when the berries are unripe or absent, or even when they are present.

II. Further Notes on the Coloration of Saw-Fly Larvæ. *

a. On the Changes of Colour undergone by certain Larvæ. —It has long been known, from the observations of Reaumur, De Geer, and many modern observers, that many saw-fly larvæ, immediately before pupating, change colour, becoming, as a rule, more obscurely and uniformly coloured, and throwing off any hairs, spines, &c., which they may have carried before. What is the meaning of this change? It might be said that in the case of a spiny larva it was in order to give it greater freedom to spin the cocoon, but obviously this answer will not explain why spineless larvæ change. The change of coloration is most conspicuous with gaudily-coloured larvæ, as, for instance, with the gooseberry grub, whose two forms of larva are often taken for two distinct species. All gaudily-coloured larvæ do not change colour; while, on the other hand, others, whose coloration is obscure, do so, although in this case the difference between the two is not very conspicuous. Unfortunately, our knowledge of the habits of these creatures in a state of nature is still somewhat limited, especially as to their modes of pupation. We cannot suppose that the change is altogether useless and meaningless, and I believe further observation will show that it is protective, either in concealing the creature, or by making it more conspicuous in the case of noxious larvæ. Saw-fly larvæ are seldom large; protected larvæ therefore can only make their presence known by feeding in company on a leaf; but when they become full-fed they have to separate, to descend to the earth to seek a resting-place, and while doing so they encounter new enemies, and are exposed to dangers of a different kind from what they had been accustomed to. Hence a change of colour might be of advantage; either a colour which would simulate the surroundings, or one which would make them more conspicuous than they were when living in companies. While some of these creatures bury themselves immediately

* See Trans. Ent. Soc., 1878, p. 141.

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beneath the food-plants, others travel some distances, in order to find a suitable resting-place. This is especially the case with those which do not pupate in the earth, but bore into the stems of pithy plants, in lieu of spinning a cocoon, or because the cocoon itself is thin. Some of these species (*Emphytus, Taxonus*) I have found at considerable distances from their food-plants in stems; and I have found a cocoon of *Lophyrus pini* in a crevice of a wall many yards' distance from any pine. The view that the change of coloration is protective is confirmed by observations I have made on two very different species, and the observations are especially interesting, as they illustrate the two forms of protective coloration. While in most cases the change is (as already mentioned) in the direction of a more obscure (generally green) coloration, in one or two instances the opposite is the case. There is a gall-making *Nematus* found abundantly along the banks of rivers on *Salix purpurea*. Living, as the creature does, in its larval state concealed in galls, it has no need of bright colours, and accordingly its body is white. At the last moult, however, it becomes entirely slate-coloured, and leaves the galls for the ground. I once found several of these larvæ on the sands which surrounded the trees, marching up to a higher portion of the river bank. I noticed especially that the colour of their bodies harmonised admirably with the sand, and thus they were very difficult to see; certainly a white larva would be much easier detected. Another species of the same group is found on *Salix aurita*. In this case, of course, the comparison with the sand does not hold, but then the slate colour agrees quite as well with the dead grass, &c., found in the marshy situations where the species lives. The other observation relates to *Cladius viminalis*. Three or four of its larvæ feed, ranged in a row, on the underside of a poplar leaf, of which they eat only the epidermis. When very young they are entirely green; gradually orange makes its appearance on the first and last segments, black marks appear on the body, which is also covered with hair; but still the green largely predominates. Then at the last moult every trace of green disappears, and the entire body is orange, save the black head and the black marks. The brilliant colour acquired when it has stopped feeding and is ready for pupating is explainable, I think, by a reference to the habits of the creature. Living several on a leaf, their presence is made sufficiently visible during the greater part of their life; but when they have

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become full-fed they separate, and each seeks a suitable hiding-place. They do not pupate apparently on their natal tree, but descend it to go in search of another, up whose trunk they march, and spin their cocoons in crevices. I have found them doing this on trees—firs, beeches—many yards' distance from any poplars. Last September I found one far from the food-plant, about six feet up on the trunk of a beech, where it was readily noticed by its gaudy colour. It was put into a tube, and in half an hour had begun to spin its cocoon. Here, then, we have the reason for the gaudy coloration acquired at the last moult; it is to make it more conspicuous than it would be if it had retained the green which it had when feeding. The species of this genus spin an irregular, thin, semi-transparent cocoon, which is spun either in chinks in the bark, or in stems of herbaceous plants. Hence they may have to go some distance before a proper place is met with.

b. Dimorphic larvæ.—The question of dimorphic larvæ with the *Tenthredinidæ* is one well worthy of attention. The subject is at present somewhat obscure, for although I have bred forms, which I cannot separate in the perfect state from differently-coloured larvæ, and might therefore conclude that they were dimorphic larvæ of the same species, yet further observation might show that in reality they were distinct species. I am not now referring to such cases as *Lophyrus similis* and *L. pini*, and *Nematus cadderensis*, Cam. and *N. croceus*, Fall. (*fulvus* H.); for although in these two cases the perfect insects cannot be separated by any distinct characters, yet the larvæ are so different in form, coloration, and habits, as to preclude the idea of their being dimorphic larvæ of the same species. I am alluding to such forms as I have described elsewhere,* where larvæ differently marked (but still having some common characteristics) produced imagos which cannot—or, at any rate, I cannot, nor can Herrn Brischke and Zaddach, as they inform me *in litt.*—be satisfactorily separated. *Nematus capreæ*, Pz., has two forms of larvæ: one, the common type, green, with white lines; and a much rarer form, which is reddish, but with the same markings as the other. Both feed on the same food-plant (*Carices*) and in the same locality. One or two species of *Cimbex* would appear

* *Fauna of Scot.*, p. 41.

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to have dimorphic larvæ, but the specific distinctions between the forms of this genus are yet too complicated to enable us to decide if the different larvæ belong to the same or to different species. Brischke and Zaddach* (and no better authorities could be stated) describe two distinct forms of the larvæ of *Cimbex saliceti*, Zad. (*lutea* auct.) on *Salix caprea*—one brownish-red, and a rarer bluish-green one. The larva of another species of *Nematus* (*histrio* Lep.), is in the great majority of cases green, but specimens are occasionally of a decided reddish hue, although I have never seen the red predominating to such an extent as with the red form of *N. capreæ*.

I find that the larvæ of the various species of *Cimbex* and *Trichiosoma* are not at all clearly defined, any more than are the perfect insects. Dahlbom † had an idea that the great variability of the imagos was produced by the food-plants, but this I regard as very doubtful; and it is certain that some forms which Dahlbom regarded as varieties are good species, presenting distinctive (although slight) characters in their larval and imago states. Several varieties of *Cimbex sylvarum*, for instance, are bred from birch, and of *C. saliceti* from willow; while the form mentioned by Dahlbom from beech is considered by Brischke and Zaddach as a good species.

c. On the Use of the Hairs on Green Larvæ.—I have already alluded to the difference in the mode of feeding of the protected and edible larvæ which feed on the flat surface of the leaf. Besides this difference in habits, there is a structural peculiarity which distinguishes them. It is that the noxious larvæ have bare, shining bodies; whereas the others have their bodies more or less covered with pale hairs. With flat larvæ, as in *Camponiscus*, they are only along the edge, which is very projecting and waved, so that the legs are entirely hid. In *Nematus pallescens* the body is more cylindrical, and covered all over with pale hairs, which, although of moderate length, cannot be seen unless the larva be examined close at hand, when it is resting on the leaf. In *Cladius*, again, the bodies are still more cylindrical, and the hairs are longer. Now, hairs of this class appear to be entirely confined to larvæ (generally green) which feed on the surface of the leaf,

* Schr. ges. König. III., pl. 11, f. 4.
† Prod. Hymen. Scand, 50.

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and, with scarcely an exception, to edible ones. *Cladius viminalis* has these hairs, like the other species of this genus, but they do not add in any way to its conspicuousness, for they are pale and scarcely noticeable, and therefore cannot be ranked with the hairs on the gooseberry grub (*Nematus ribesii*), which undoubtedly tend to render it more easily seen.

From the pale woolly appearance of these hairs, and from the fact that most of the larvæ of *Cladius* are green and inconspicuous, it is probable that *C. viminalis* and *C. aeneus*, Zad., are the youngest species, and that the hairs derived from the primitive pale-coloured ancestor have been retained, although no longer aiding concealment.

Now what is the use of these hairs? I believe that suggested by Meldola and Lubbock,* to prevent the body throwing a sharp shadow on the leaf, which would certainly happen if the bodies were perfectly bare. It is possible, too, that the hairs in *Cladius*, and the spines in *Blennocampa* (*e.g.*, *B. geniculata*), may in addition to this purpose, serve as a protection against the attacks of ants and other carnivorous insects. I believe the green, spiny larvæ are as a rule nocturnal feeders, resting motionless during the day on the underside of the leaf. Such, at any rate, is the habit of those of *Macrophya sturmi*,† Kl., which feed in company, and they give out a bad smell. One kind of larva of this class (*Nematus compressicornis*, Fab., *vallator*, Voll.)‡ has the curious habit of surrounding itself with a wall of dried bubbles secreted by itself, apparently as a protection against insects.

In regard to this subject, I notice a very suggestive remark by Fritz Müller,§ which is very well illustrated by certain Tenthredous larvæ. He says (alluding to the caterpillars of butterflies) that obscurely-coloured larvæ must either live solitary and hide themselves, or acquire a bad odour and congregate together. These, by living in companies, surround themselves with a fetid atmosphere, and thus make their presence as effectually known as if they were gaudily coloured, or armed with hairs and spines. This is precisely what we find with the larvæ of *Eriocampa*, and others, as mentioned in my last paper. *Eriocampa adumbrata* appears to have reached the

* Trans. Ent. Soc., 1878, 214.
† Cf. Kaltenbach, *Pflanzenfeinde*, 83.
‡ Cf. Vollenhoven, Tijd. Ent., i., 191, pl. 12.
§ Quoted Proc. Ent. Soc., 1878, vi.

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highest phase of this protective coloration ; for not only do its larvæ have a bad smell, and are covered with a resinous secretion, but they resemble very closely the droppings of a bird.* *Dineura stilata* and *D. degeeri* afford other instances. I am strongly inclined to believe that the obscure coloration of these protected larvæ has been acquired as a protection against ichneumons, by rendering them less conspicuous, while the secretions have been acquired against the attacks of carnivorous insects. Flat larvæ like those of *Eriocampa* cannot defend themselves with the abdomen like those which feed along the edge of the leaf, as I have already explained. It is worthy of remark that the *Eriocampa* and *Dineura* larvæ are not always exhaling the odour, but only when danger is near.

It may be noted here that the habit of congregating together on the upper or lower surface of the leaf, and eating only the epidermis, is not confined to saw-fly larvæ. We have a very good illustration of it with *Phratora vitellinæ*, the beetle whose larvæ are so common on willows. And the reason of it is obvious. A large, gaudily-coloured larva might live apart, and be still easily observed; but the only way small larvæ can make their presence known is by massing together.

III. On Parthenogenesis in the Tenthredinidæ.

The first indication of the occurrence of Parthenogenesis with the *Tenthredinidæ*, was recorded by a gardener named Thorn,† who had observed *Nematus ribesii* to deposit fertile eggs without having had any access to males. This observation remained unverified until 1866, when Kessler, a German naturalist, confirmed it.‡ The same species formed the subject of many careful and extended experiments by Von Siebold§—experiments which proved beyond all doubt that Parthenogenesis was a common phenomenon with this saw-fly ; and that only males were produced out of the unfertilised eggs.

Last year I experimented with *N. ribesii*, and had no difficulty in getting several females to lay eggs without

* As remarked by Jordan, Ent. M. Mag., viii., 252.

† *Gardener's Magazine*, vii., 196.

‡ Die Lebensgeschichte von Centorhynchus sulcicollis und Nematus ventricosus. Cassel, 1866.

§ Beitr. zur Parthenogenesis der Arthropoden. Leipzig, 1871, pp. 106—130.

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their having had any connection with males, and from these eggs I bred only males. A few years ago I got an unfertilised ♀ of *Nematus miliaris*, Pz. (*viridis* Htg.), to lay eggs, but the larvæ which they yielded, unfortunately died in the cocoons during the winter.* Last year I was more successful with this species, and succeeded in rearing the imagos from unfertilised eggs: they were all males. *N. miliaris*, I may remark, has the males—if not as abundant as the other sex—tolerably numerous. I was also fortunate enough to get *Strongylogaster cingulatus* Fab., *Phyllotoma nemorata*, Fall., and *Hemichroa rufa*, Pz., to lay unfertilised eggs, which yielded larvæ, but unfortunately they all died very young. The ♂ of *S. cingulatus* is known, but is certainly very rare; while the males of the other two are quite unknown, although they are very common species and have been often bred. I experimented with several other species, but the result was altogether negative: they would not lay; nor indeed would all the individuals I had of the species I have mentioned.

Mr. J. E. Fletcher, of Worcester, has kindly communicated to me the results of some experiments he made last year on the same subject.† He got the common gall-making species, *Nematus gallicola (Vallisneri)* to oviposit, but the gall did not come to maturity, owing apparently to the plant being small and weak. Mr. Fletcher was more fortunate with *Nematus curtispina*, Thoms., and *N. palliatus*, Thoms., having managed to rear from unfertilised eggs 21 ♂ and 1 ♀ from the former, and 2 ♂ from the latter species. That a ♀ should appear as with *N. curtispina* is certainly very exceptional, but I have no doubt of the correctness of Mr. Fletcher's observations; although it is quite possible that the egg may have been brought in with the food-plant, or a pupa may have been put in by mistake, as happened to Von Siebold when conducting his experiments. Both species are closely related to *N. miliaris*, but both are good species.

From the above remarks it will be observed that the experiments were only completely successful with those species which have the males tolerably common; while they have only shown that those species which have the males exceptionally rare, or altogether unknown, are capable of laying fertile eggs, but without telling us if they

* *Scot. Nat.*, iv., 157.

† See also Ent. M. Mag., May, 1880, p. 269.

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would yield males or females. The unfertilised eggs of *S. cingulatus* might produce males; but the probability is that *Hemichroa rufa* and *Phyllotoma nemorata* would give issue to females, seeing that no one has ever caught or bred the males of these common species. There is equally good evidence that complete parthenogenesis occur with *Eriocampa ovata*, L., and *Poecilosoma pulveratum*, Fall. (*obesum* Klug.). The late Frederick Smith once bred between 300 or 400 flies from the larvæ of *E. ovata*, and not one of them was a male, while it has recently been shown by Mr. Bridgman* that an unfertilised female can lay fertile eggs, but Mr. Bridgman's larvæ unfortunately died young. I have shown too elsewhere† that *P. pulveratum* (whose male is unknown) is a parthenogenetic species. I think then we are justified in concluding that complete and mixed parthenogenesis exist in the *Tenthredinidæ*.

Von Siebold in his book has analysed Hartig's *Blattwespen* in reference to the scarcity of males with these insects, and shows that Hartig was apparently unacquainted with the males of 76 species out of a total of 381. Since the publication of Hartig's classical work, our knowledge of the habits of saw-flies has enormously increased, while the differences between the sexes are much better understood. Still, with all that, the males of many species remain to be discovered. I find that out of some 330 British species, the males of 53 have yet to be found. No doubt many of these are rare and little known forms, so that much stress cannot be laid on them as showing the scarcity of males, but the same result is shown in another way. Tabulating the British species in my collection, I find that, in addition to the maleless species noted above, 54 species are represented by females only, so that altogether I have never seen the males of 107 species. In the large genus *Nematus*, the males are very much rarer than the other sex, even with common species. *Nematus pavidus*,‡ for example, is a species I breed regu-

* Ent., 1878, 191.

† Ent. M. Mag., xv., 12.

‡ Last autumn I found about two dozen of the larvæ of this species on a willow bush, nearly full-fed. They were placed in a jar together with not more than a day's supply of food, and forgotten for a week. Most of them were then found dead: two spun cocoons and yielded ichneumons (*Mesoleius opticus*), and three had turned to pupæ without spinning a cocoon. These proved to be two males and one female, the former of the usual size, the latter rather small and dark coloured.

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larly, yet I have only got four males during several years. Now males are, as a rule, much easier bred than females owing to their smaller size, and to their appearing seven or eight days earlier than the females, so that, if they were at all common, the chances are all in favour of the observer rearing them.

The phenomenon would appear to occur with closely allied species in all the genera. Thus we have (mentioning only common species) *Hemichroa rufa* with the ♂ unknown, and *H. alni* with it very rare, while the closely allied *Dineura verna* has no male. Then there are *Poecilosoma pulveratum* and *P. luteolum*, and two or three species of *Fenusa* with no known males; the same is the case with *Blennocampa albipes* and *B. ephippium*, while the closely allied *B. fuscipennis*, Fall. (*luteiventris* Kl.), has the ♂ very rare. So it is with the too common *Eriocampa adumbrata*, while, as stated already, *E. ovata* is unisexual. Again, the males of *Hoplocampa brevis*, Kl., and *H. rutilicornis*, Kl., have not been described, while of the large genus *Nematus* we have *N. Erichsoni*, Htg., and *pallidiventris; leucotrochus*, H., and *conductus*, Ruthe; and (as before mentioned) *palliatus*, *curtispina* and *miliaris*.

Note.—Since writing the above paper, Mr. Meldola has directed my attention to a paper of his (Proc. Zool. Soc., 1873, p. 155) wherein he has given a similar explanation of the change of coloration in larvæ before pupation to that stated on p. 71. Mr. Meldola gives as examples of this habit various species of *Lepidoptera*.

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VII. *On* Cetonia aurata *and* Protaetia Bensoni.

By J. O. Westwood, M.A., F.L.S., &c.

[Read 7th April, 1880.]

The investigation of the claims of many so-called species of insects to be regarded as such on account of slight characteristic distinctions occurring in individuals inhabiting adjacent but distinct localities, possesses a very important bearing on the great question of the origin of species, especially when the objects of the inquiry occur in a free state of nature, undisturbed by the influence of man, and resulting as might perhaps be inferred from modifications of locality, or temperature, or food, or times of appearance. This, it must be admitted, is a very different question from that in which the various modifications in the individuals of a given species have resulted from the action and influence of man, or even by his partial interference. The variations in the various breeds of dogs or of pigeons have doubtless been greatly influenced by human agency, but animals in a wild state of nature must be regarded as having followed a normal state of existence, and if variations have been produced in them, we have a far truer clue to the agency of nature than in the case of domesticated animals and their variations.

The mode in which variation is effected in a given species requires a preliminary inquiry as to the exact differences which exist between any given set of individuals. How and in what manner a variation has taken place is a far more difficult question. In the Transactions of the Entomological Society for 1872, I have endeavoured to trace the variations from the typical state of several species of butterflies, as *Papilio Sarpedon*, *P. Anchises*, &c., whilst in the *Entomologische Zeitschrift* of the Berlin Society, Dr. Kraatz has for several years past been endeavouring to prove that many of the so-called new species of Coleoptera, especially of Carabidæ, are only geographical varieties, or local modifications, or sub-species, or representative species, or by what other name they may be called. In the last part of this work, just published (1879, Heft II.), there

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is a paper by the same author, entitled, "*Cetonia aurata* Linné (der Goldkäfer) am Amur in *Euryomia*- und *Glycyphana*-arten verwandelt = *Protaetia Bensoni*, Westw. von Himalaya? ein Beitrag zur Kritischen Deutung der *Cetonia*-formen," pp. 240—252, in which the author endeavours to prove that *Cetonia cupreola*, Kraatz, *Glycyphana viridi-obscura*, Motsch., *Euryomia amouriensis*, Motsch., *Glycyphana pilifera*, Motsch., and probably *Protaetia Bensoni*, Westw., Trans. Ent. Soc., Lond., vol. V. (1849), p. 145, Pl. 16, f. 3, are all merely varieties of *Cetonia aurata*.*

At the meeting of the Belgian Entomological Society on the 3rd January, 1880, the Baron von Harold, alluding to the remarks of Dr. Kraatz, admits their correctness, and adds that *C. Carthusia* may be added to the number of varieties, but that *C. pilifera* must be regarded as a distinct species, with which he considers *Pr. Bensoni* to be identical, the latter being more strongly punctured.

I do not feel called upon to support the claim to specific rank of the five first-mentioned supposed species, my object being to exhibit the typical specimen of *Protaetia Bensoni* side by side with an English *Cetonia aurata* in order to prove their specific distinctions.

P. Bensoni will thus be seen to be a much smaller, more slender, and flatter insect, with comparatively more slender limbs; a complete coat of dull green velvet-like pile, with white markings differing from those of the *Cetonia* in the two straight white lines down the pronotum, and especially in the shape of the head, which is much more conical in front than in the *Cetonia*. Taking all these characteristics into consideration, I must be allowed to maintain my conviction that *Protaetia Bensoni* cannot be regarded as a local modification of *Cetonia aurata*. If the specific identity of the two insects be maintained, size, form, sculpture, clothing, markings, and geographical distribution must no longer be regarded as affording specific distinctions.

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* I will not here enter into any defence of the different genera of *Cotoniidæ* here alluded to. I fear it must be allowed that far too many genera have been established not only in this, but in very many other families of insects.

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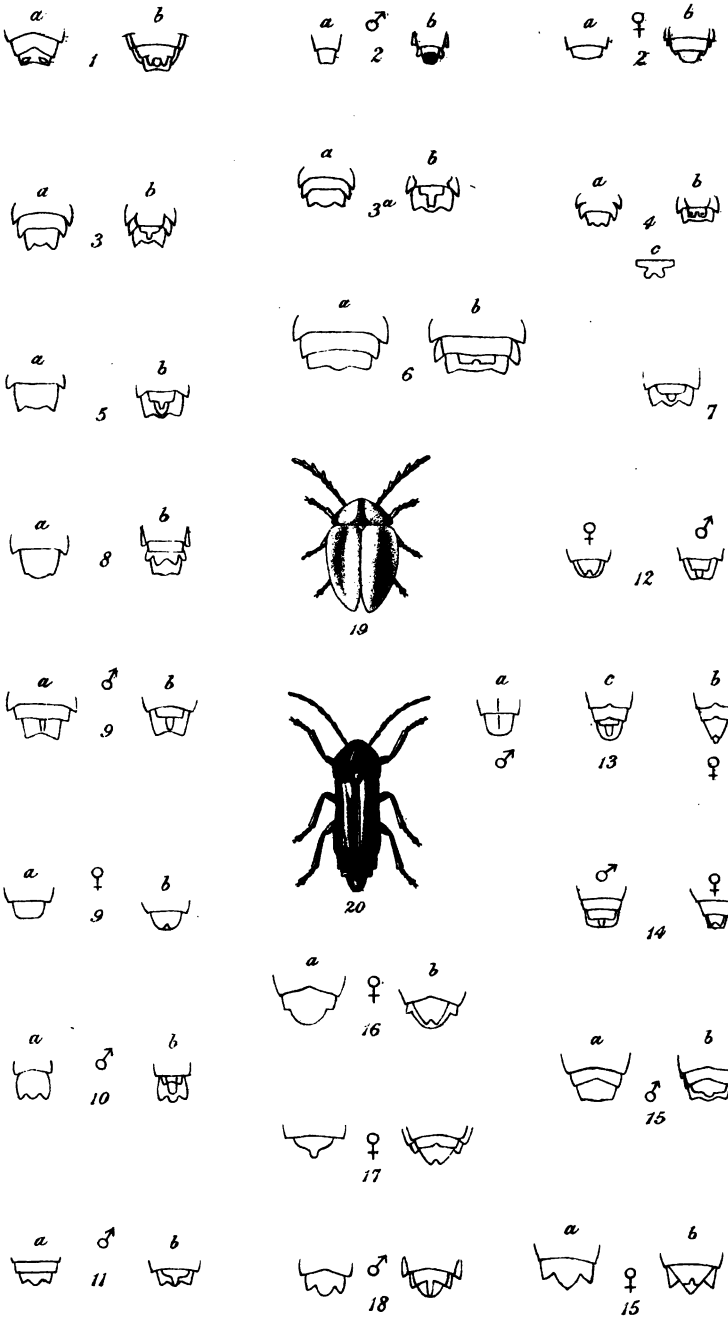

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VIII. *Materials for a revision of the* Lampyridæ. By the Rev. H. S. Gorham.

[Read June 2nd, 1880.]

Plate I.

(Concluded from Part I. of the Transactions, p. 36.)

List of New Species.

Aspidosoma ægrotum.
" depictum.
" diaphana.
" pulchellum.
" bilineatum.
" costatum.
Lamprophorus crassus.
Diaphanes limbatus.
" guttatus.
" Javanus.
Pyrocœlia *genus novum*.
" terminata.
" lateralis.
" plagiata.
" fumigata.
" Foochowensis.
" Pekinensis.
Lampyris Huddi.
Megalophthalmus Guatemalæ.
Luciola substriata.
" affinis.
" Malaccæ.
" tabida.
" pallescens.
" costipennis.
" xanthura.
" carinata.
" spectralis.
Photuris tristissima.
" fumosa.
" collaris.
" ruficollis.
" lucidicollis.
" mexicana.
" amœna.
" scutellata.
" funestis.
" mollis.

Aspidosoma, Cast., Munich Cat., p. 1645.

A. *Elytris ovatis apicem versus attenuatis.*

Aspidosoma ignitum, Linn. Syst. Nat. I., p. 645.

Columbia, Cayenne, and Antilles; Mus. Brus., Gorh.; Caracas, Mus. Brus., Coll. Chev.; Rio Hondo, Honduras, coll. Godman and Salvin.

Aspidosoma laterale, Fab. Syst. El. II. 106.

Amer. mer. "Huanaco," Mus. Brus.; Costa Rica; *Hab.* ? Gorh. [Norris.]

This is one of the largest species, nine lines.

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Aspidosoma sticticum, Gemm. Col. Heft. VI.
,, *maculatum*, Fab. Ent. Syst. Sup. 125.

Brazil, Buenos Ayres; ♀ Bolivia, Mus. Brus. *Hab.* ?—Gorh. [Norris.]

The thorax has a spot at each hinder angle and sometimes a linear one near the apex. Length, 7—9 lines.

Aspidosoma lineatum, Gyll. Schön. Syn. Ins. App. p. 23.

Mots. Etud. Ent. II. 11.
Brazil, Rio Janeiro; Mus. Brus.; *Hab.* ? Gorh. ♂, ♀.

Like *laterale*, but smaller.

Aspidosoma cassideum, Mots. Etud. Ent. II. 14.

Brazil; *Hab.* ? Mus. Brus.

Elytra of an uniform rusty red, strongly attenuated towards the apex. Length, 7—9 lines.

Aspidosoma fenestratum, Blanch. Voy. d'Orb. 111.

Cayenne and Bolivia; Mus. Brus. [Guér. Men.]; ♀.

Like *ignitum*, but the elytra with two pale lateral spots, one humeral, one median.

Aspidosoma polyzonum, Chev. Col. Mex. Cent. I. fasc. iii. 51.

Mexico; coll. Chev.

I cannot distinguish this from *ignitum* L.; there is a specimen of *ignitum* from the Antilles; it may therefore extend to Mexico.

Aspidosoma grossum, Er. Wieg. Arch. I. 81 ?

Peru; Mus. Brus.

There is a specimen in the Belgium Museum which I think is this. Fuscous; elytra obscurely lined with paler towards the apex, and with the anterior half of the expanded margin whitish yellow. Length, 7 lines.

Aspidosoma ægrotum, n. sp.

Ovale, antice posticeque attenuatum, prothoracis elytrorumque marginibus late sub-diaphanis, illo disco piceo, lineâ medianâ guttisque lateralibus miniatis, angulis externis obsolete fuscis; his maculâ post medium obscurâ,

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disco subfusco, suturâ et lineis duabus pallidis; pectore, scutello abdomine basi et apice piceo.

Long. lin. 6½—7. ♂, ♀.

Mas.—Abdominis segmentis quinto et sexto læte flavis, ad margines albis, utrinque impressis, late emarginatis; septimo fusco emarginato, apicali parvo, elongato-ovali: Oculis parum majoribus. *Femina,*—segmentis tribus ultimis pallidis, ad basin fuscis, marginibus miniatis, apice exciso.

Head yellow, antennæ and palpi fuscous, the former with the basal joint pale, prosternum rosy. Legs and underside of body dark pitchy-fuscous, extreme base of thighs paler. Abdomen fuscous, with the ventral segments paler in the middle at the apical margin; in the male two diaphanous segments.

The rather elliptical form and entirely pale margin of the elytra with an obscurely fuscous spot, will distinguish this species.

Guatemala, Capetillo; coll. Godman and Salvin.

Var. ? Elytris postice magis angustatis; corpore subtus, pedibusque totis pallide flavis.

Nicaragua, Chontales; Rio Janeiro ?

There is undoubtedly a Brazilian species very closely allied to, if not identical with this.

Aspidosoma depictum, n. sp.

Nigro-piceum, nitidum, prothorace, elytrisque subdiaphanis, his disco maculisque duabus, unâ subhumerali, alterâ paulo post medium fuscis, illo disco nigro-piceo extus late miniato, et ad angulam externam infuscato. Elytrorum disco lineâ singulari et suturâ tenuiter pallidis.

Long. lin. 7. ♂, ♀.

Mas.—Oculis majoribus, abdominis segmentis quinto et sexto læte flavis, limbo laterali fuscis.

Femina.—Segmentis ventralibus duobus penultimis flavis, fusco maculatis, apice bi-mucronato.

Head, prosternum, and pleural fold of a carmine red, the first with a dark dot between the eyes; thorax twice as wide as long, its disc pitchy and glabrous, with a very narrow central red line, but the apex diaphanous; the outer angles have a large fuscous spot.

The elytra have the discoidal portion, a basal spot, and a lateral larger one fuscous; the discoidal portion divided by a single narrow line. The scutellum and body beneath, with the legs and antennæ, are fuscous, almost pitchy.

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Irazu, Costa Rica; coll. Godman and Salvin.

Obs.—This species is more conspicuously marked than most of the genus; in form it resembles *ægrotum*, being elliptical, but all the species vary in this respect, some specimens being more ovate than others.

Aspidosoma diaphana, n. sp.

Ellipticum, elytrorum et prothoracis marginibus subdiaphanis; thoracis disco et angulis externis, elytrorum disco et maculis duabus (basali obsoletâ) sordide fuscis, illo lineis tribus pallidis.

Long. lin. 5½. ♀.

Very like the preceding but smaller, the thorax not so short but similarly coloured, the basal spot only of the elytra indistinctly marked, and the posterior lateral one further back; the disc of the elytra with three obscure pale lines on each, and the body beneath, and legs yellowish, clouded here and there with fuscous.

Rio Sarstoon, Honduras; coll. Godman and Salvin.

Aspidosoma pulchellum, n. sp.

Flavo-testaceum, thorace subdiaphano, vittâ medianâ basi et angulis externis nigris, subrugose punctatis, utrinque maculâ miniatâ; elytris fuscis, suturâ tenuiter, et externe late albidis.

Long. lin. 4—4¼. ♂, ♀.

Head, middle of the body beneath, and base of the antennæ and legs pale yellow, sides of the breast and abdomen fuscous; the two usual segments bright yellow in the male, the prosternal region rosy-carmine. Elytra with one raised nervure on their disc; ovate, a little narrowed behind, punctured, the suture and nervure very finely whitish yellow.

Rio Sarstoon, Honduras; coll. Godman and Salvin.

B. *Elytris subparallelis vel elongato-ellipticis, sæpe costatis.*

Aspidosoma bilineatum, n. sp.

Elongato-ovale, nigro-piceum, thorace pallido disco utrinque miniato, maculâ transversâ basali, vittâque medianâ et maculis lateralibus fuscis, elytris fusco-piceis bicostatis, costis limboque toto tenuissime flavis.

Long. lin. 6—7. ♂, ♀.

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Mas.—Abdominis segmentis quinto et sexto læte flavis, nitidis.

Femina.—Iisden in medio et ad latera fusco notatis.

The oblong form nearly evenly rounded in front, and at the apex of the elytra combined with the fuscous elytra, of which only the extreme margin, the suture, and the raised nervures are paler, will readily distinguish this from any of the section A. The discoidal nervure is costate, nearly straight, not reaching the apex; between this and the suture is a second, but finer and less raised, and vanishing at two-thirds of the elytral length. The body beneath, the legs and antennæ are entirely pitchy, with only the diaphanous segments paler.

Mexico; Mus. Brus., coll. Gorh., Capetillo; coll. Godman and Salvin.

Aspidosoma costatum, n. sp.

Oblongo-ovale, thorace maculâ transversâ basali, vittâ medianâ, utrinque miniatâ piceis, maculis lateralibus paulo distinctis; elytris fusco-piceis, bicostatis, suturâ et costis tenuissime, margineque laterali latius pallidis.

Long. lin. 4—5. ♂, ♀.

Head, body beneath and legs pale, more or less clouded with fuscous; thorax pale and sub-diaphanous, markings as in *bilineatum*, but the lateral spot only indicated by a darker spot about the middle of the margin. Elytra with the discoidal costate nervure well marked and the callus strongly raised.

Panama; Rio Sarstoon, Honduras; coll. Godman and Salvin.

GROUP II. LAMPYRIDES.

LAMPROPHORUS, Munich Cat. p. 1646.

Lamprigera, Mots. Etud. Ent. i., p. 47.

The females of this genus are still unknown. I have nine examples before me, all of which are males. The dorsal abdominal plates are wide and lobed, or acutely angled at the sides. The eyes are enormous, and the antennæ short and rudimentary; their apical joint terminates in one or more mucronate points. The species seem readily divisible by the proportions of the antennal joints, and by the form of the pygidium.

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Lamprophorus tenebrosa, Walker, Ann. Nat. Hist. 1858, p. 282.

Testaceo-brunneus, thorace semicirculari, tenuiter carinato, disco sub-rugose punctato, nigro, margine antico et limbo laterali testaceo, angulis posticis paululum acutis; elytris obsolete costatis, ad apicem gradatim attenuatis, abdominis apice et segmentorum quatuor marginibus nigris; antennarum apice denticulis minutis nonnullis, et mucrone unica instructis.

Long. lin. 7—9, ♂.

Mas.—Pygidio lateribus rotundatis, apice leviter late emarginato, segmento pro-pygidiali angulis externis acutis retrorsum productis.

The eyes occupy the greater part of the head, but are separated by the crown, which is strongly concave. The antennæ have the basal joint stout, obliquely truncate; the second is as long and nearly as stout; the third much narrower; conico-cylindrical, about the same length, the fourth, fifth and sixth longer than wide; from this point to the apex the joints are reduced in length, becoming transverse, the apical one short, ovate, and with a central slightly curved mucro.

Only *seven* segments are clearly discernible below, but the penis appears to have a two-lobed appendage at its base, which is perhaps really the eighth.

Ceylon; Brit. Mus. (*Type*).

Pondicherry; Brus. Mus. and Gorh. [Norris], also India, from Mr. E. Hudd.

Obs.—This species appears from his description to resemble *L. Boyei*, Mots., but in addition to the different *Hab.*, the antennæ are not bi-mucronate. In some specimens the pygidium and preceding segment project beyond the elytra, but in a small example are covered.

Lamprophorus crassus, n. sp.

Elongatus, subparallelus, testaceus, capite, thoracis disco, elytris, abdominisque segmentis dorsalibus nigropiceis.

Long. lin. 9. ♂.

Mas.—Abdominis segmentis tribus penultimis fortiter lobatis; pygidio bilobato lobis latius lanceolatis.

This species differs from *L. nepalensis* by the very short lunate thorax, of which the hind-angles are much more

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acute; the disc of the thorax is shining and uneven, with a tumid space on either side, the centre finely carinate.

The elytra are longer and more parallel, and entirely cover the abdomen, in the single specimen I have seen. The scutellum is pitchy. The dorsal plates are dark, excepting the base of the pygidium, and the latter presents a very striking difference to *Nepalensis* in being deeply cut out, so as to make the apex bilobate. The antennæ have their second joint stout, but shorter than the first; the third longer than second, from thence gradually shortening, the eighth being quadrate, ninth, tenth, and eleventh short, terminated by a single mucro. They are not serrate, but the apices are obliquely truncate.

Pondicherry; Mus. Brus.

Lamprophorus Nepalensis, Gray, Zool. Misc. p. 26.

Abdomen largely lobed, the penultimate as well as the pygidium pale, the latter truncate, very slightly emarginate. Antennæ a little serrate, apical joint short, ovate, clothed with yellow hairs. I fail to see the short double mucro attributed to it.

Hab.—Nepal; Brit. Mus. (*Type*).

Assam plains, and Khasia hills, Gorh.

Lamprophorus diffinis, Walker, Ann. Nat. Hist. 1858, p. 282.

Hab.—Ceylon; Brit. Mus. (*Type*).

Near *Nepalensis;* differs by its smaller thorax, with the hind angles not acute, and the base and apex of the elytra are yellowish brown.

Lamprophorus Boyei, Mots. Etud. Ent. iii. 23.

Pygidium emarginate, all the dorsal plates strongly lobed, and excepting the two last dark above.

Amboina; Mus. Brus.

Obs.—I have no doubt I am correct in my reference of this specimen, but the antennæ are not correctly described; the second joint is longer and less stout than in *Nepalensis*, the apical *four or five joints* have each a double tubercle or blunt mucro on the inner side, which is in fact a rudimentary lamella, and the apical double point corresponds to this rudimentary part.

DIAPHANES, Mots. Etud. Ent. i. 44.

Though very close to *Lampyris*, this genus has a particular facies of its own, from the elevated margins of the thorax and wider elytra. The eyes are very large, even more developed than in *Lampyris* or *Lamprorhiza*, the abdomen not so acutely lobed as in the former, the fifth and sixth segments with transverse luminous spots. The species appear to be Indian or Malayan, but some of the African might be introduced, *e.g.*, *marginipennis*, Boh.; but as most of them are true *Lampyrides*, I prefer keeping this for the Eastern species.

Diaphanes indicus, Mots. l. c. iii. 15.

India; Mus. Brus. ♂.

Diaphanes limbatus, n. sp.

Sub-parallelus, opacus, fuscus, thorace testaceo disco infuscato, margine antico fortiter reflexo, liturâ submarginali diaphanâ, elytrorum limbo toto, pectore, femoribus infra, abdominisque apice flavis.

Long. lin. 7—10. ♂.

Mas.—Oculis magnis, pygidio apice leviter bisinuato, segmento septimo ventrali apice rotundato, integro.

Head fuscous, eyes as in *Lamprophorus*. Antennæ scarcely longer than the head itself, fuscous; their basal joint large, rather paler, the second very short, the succeeding ones longer than wide, setose, obliquely truncate, the two before the apical shorter, but not transverse; thorax elongate hat-shaped, the lateral and front margin reflexed; the disc convex, with a fine carinate line from the base to the apex, which with the sides is yellow, as well as the base itself narrowly; the elytra are smoky fuscous, with the suture and lateral margin very narrowly yellow. Thighs above, tibiæ, tarsi, and abdomen fuscous, with the exception of two luminous transverse spots on the fifth and sixth segments, the apex of the pygidium, and seventh or apical segment, which are yellow. The thorax has two diaphanous spaces at the front, which are almost joined, and which are quite translucent, so that the head can be seen through from above.

India; coll. A. E. Hudd, and Gorh.

Diaphanes guttatus, n. sp.

Niger, supra testaceus, thoracis disco ad basin, elytrisque vittis duabus, paulo distinctis, fuscis.

Long. lin. 5½. ♂.

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Mas.—Pygidio apice truncato, subsinuato, pallido, segmentis ventralibus duobus penultimis maculâ flavâ transversâ, apicali toto pallido.

Head very concave between the eyes, which are large and contiguous in front, as usual in this genus; thorax with the margin reflexed, and elevated in front, where there are two diaphanous spaces. Antennæ of the length of the thorax, filiform. Body, legs, and wings fuscous black.

Bengal; Mus. Brus. [Guérin].

Diaphanes Javanus, n. sp.

Niger, thorace, femoribus et tribus segmentis ventralibus testaceis, his nitidis, marginibus albis; elytris fuscis, suturâ et marginibus lateralibus conjunctim albido-flavis, antennis brunneis.

Long. lin. 5 ♂.

Allied, no doubt, to *D. adustus*, Mots., but does not agree in colour with his description. The eyes are very large; the thorax has the usual diaphanous spots, and with the scutellum, coxæ, femora, inner side of tibiæ, pleura of metasternum, and margins of elytra (excepting at their base), is pale testaceous yellow.

Java; Mus. Brus. [Guérin].

PYROCŒLIA, genus novum.

Head received into the prothorax, eyes small, or at most, moderate; antennæ nearly half the body's length, compressed, joint 2 very short, 3—10 strongly serrate, 11, small, oval. Thorax as in *Diaphanes*, front margin strongly reflexed, sometimes with sub-diaphanous areolets. The two segments preceding the apical one luminous, the diaphanous spots transverse, occupying most of the plate, and eburate. Legs rather long, femora reaching to the elytral margins. Abdomen with the dorsal segments, with acute hind angles, produced backwards, sublobate. Pygidium bisinuate, the middle lobe a little prominent.

This genus is superficially very like *Diaphanes*, the antennæ are very different; the thorax does not possess the diaphanous areolets, or in a much less degree. The eyes are comparatively small.

Lampyris bicolor, Fab., appears to me to belong to this genus, which seems composed exclusively of Eastern species. The females are hardly known.

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Mr. G. Lewis has assured me that the female of one species (*Foochowensis*) is apterous, and I have two females sent me by Mr. A. Hudd, which I believe belong to an Indian species; they are entirely yellowish brown, with the prothorax similar in form to that of *P. bicolor*, F., but longer, with reflexed anterior margin; the meso-thoracic plate above has a fine carina, indicating the scutellum; the dorsal abdominal plates are obsoletely channelled, not lobed nor produced backwards at their angles; ventral plates similar in form to the dorsal, but with a pleural fold on which the stigmata are conspicuous.

Length, 13—15 lines.

Pyrocœlia is not congeneric with any of Motschulsky's divisions, nor, with the exception of *bicolor*, has there, I think, been any species described which I can refer to it.

Pyrocœlia bicolor, Fab. Syst. El. ii. p. 100; Cast. Essai, p. 143 (*Photinus*); Munich Cat., p. 1645 (*Cratomorphus*); "Nov. Cambria."

Java; Mus. Brus., Gorh. &c.

Obs.—*Lampyris lutescens*, Walker, Ann. Nat. Hist. 1858, p. 282, from Ceylon, is, I think, identical with this.

Pyrocœlia terminata, n. sp.

Nigra, opaca, prothorace elytrisque brunneo-testaceis, his apice nigro, illo antice acuminato, margine frontali fortiter reflexo, areolis parvis diaphanis.

Long. lin. 8. ♂.

Head and antennæ black, mouth testaceous, palpi black at their apex. Thorax entirely brownish yellow, hind angles a little produced backwards, acute, lateral margins sinuate, contracted at the base. Elytra oval, widening rather quickly from the shoulder, not costate, callus, rather prominent; closely punctured, tipped with black. Scutellum and meso-sternum yellow. Body, legs, and wings smoky-black.

India; coll. Gorh.

Pyrocœlia lateralis, n. sp.

Nigro-fumosa, opaca, prothorace, mesosterno, elytrorum limbo laterali, suturâ tenuissime, scutello, abdominisque segmentis quinto et sexto flavis.

Long. lin. 7½. ♂.

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Head black, eyes moderate, antennæ of normal length, *i.e.* reaching to about the middle of the meta-sternum, serrate. Thorax rather small and short, without diaphanous areolets, base nearly straight, hind angles scarcely produced. Elytra with a rather wide yellow margin narrowing towards the apex, where it vanishes. Suture very narrowly yellow at the base.

Ceylon; coll. Gorham.

Pyrocœlia plagiata, n. sp.

Nigro-fusca, opaca, prothorace elytrisque flavis, his plagiâ nigro-fumosâ, in medio incipiente ad apicem latiore.

Long. lin. 8½. ♂.

Head and eyes small, retracted within the thorax; antennæ of normal form and length, the joints from the third, sub-quadrate and not strongly dentate, only a little acuminate internally. Thorax with the front margin reflexed, but not strongly, nor with diaphanous areolets; hind angles a little acute. Elytra four times the length of the thorax, the suture and two nervures finely raised, with a long apical, black plagia commencing in a point about the middle of the disc and widening till it occupies the whole apex. Abdomen fuscous black with the exception of the two diaphanous segments.

Hab. ?—Mus. Brus. India ?

Pyrocœlia fumigata, n. sp.

Testacea, capite, antennis, abdominis segmentis tribus, elytris retrorsum, pedibusque fumeo-nigris.

Long. lin. 8. ♂.

Thorax with the front a little raised, plain at the sides and hind angles, which are right angles but rounded. The elytra are a good deal rounded at the sides, ovate, with very slight traces of two costæ. Head black, eyes moderate, antennæ about as long as the *width* of the thorax. Apex of the abdomen whitish yellow.

Malacca; Siam; coll. Gorh.

Pyrocœlia Foochowensis, n. sp.

Testacea, opaca, sub-parallela, capite, antennis, abdominis segmentis quatuor, pedibus, elytrisque nigro-fuscis; his suturâ marginibusque conjunctim, illis femoribus flavis.

Long. lin. 8. ♂.

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At first sight similar to *Lampyris marginipennis* and a little to *Diaphanes limbatus*, separable of course from both by the compressed, serrate antennæ. The thorax is much shorter than in the latter, obsoletely carinate and with acute angles, the front with two diaphanous areolets. The elytra are opaque, and the colour of the abdomen will separate it from *marginipennis* (in which it is wholly yellow.)

China, Foochow (Lewis); coll. Gorh. Brit. Mus.

Pyrocœlia Pekinensis, n. sp.

Nigro-fumosa, thoracis disco abdominique flavis, antennis thorace duplo longioribus, compressis.

Long. lin. 6. ♂.

Thorax much narrower than the elytra, the margin entirely fuscous-black, but only finely at the base. Disc and prosternum yellow. Elytra with the sides sub-parallel.

China; coll. Gorh., Pekin; Brit. Mus.

LAMPYRIS, Geoffroy, Munich Cat. p. 1647.

Type, *L. noctiluca*, Lin.

Lampyris noctiluca, Lin.,—Fab.,—Jacq. Duv. Mon. i. 7, fig. 2.

Europe; all collections; rarer in the South and East. Female with only the attachments of the elytra, and a scutellar, sulcate, carina.

Lampyris Lareyniei, Jacq. Duv. Mon. i. 12, fig. 5.

Sardinia; Corsica; Mus. Brus., Gorh. (Plason), ♂, ♀.

Colour paler, and thorax longer than *L. noctiluca*, and with hind angles right instead of acute. ♀ with very small rudimentary elytra, and scutellum developed; of a pale yellow colour.

Lampyris lusitanica, Mots. Etud. Ent. iii. p. 19.

,, *Raymondi* Muls. et Rey. Ann. Soc. Agr. Lyons, iii. p. 222.

France (Hyeres); Spain, Portugal; Gorh. (Plason). ♂.

I cannot find any satisfactory point of difference in the males of this and *noctiluca*; the female is said to have small rudiments of elytra.

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Lampyris Bonvouloiri, Jacq. Duv. Mon. ii. p. 101.

Italy; Gorh. (Plason). ♂.

Lampyris Zenkeri, Germ. Mots. Etud. Ent. iii. p. 17.
,, diluatia, Cast., Guérin Voy. Lefebr. p. 301, Pl. iii.

France (in the south); Mingrelia; Mus. Brus. Gorh. Abyssinia; Mus. Brus. [Guér. Type]. Greece, Athens.

The latter is the locality of *L. diluatia*, Guérin, on the type specimen with ticket in his own writing. I think it is scarcely separable from *Zenkeri*; the thorax is a little more contracted at the base, and the elytra and suture finely yellow at the margins.

Lampyris Reichei, Jacq. Duv. Mon. i. 13, fig. 6.
,, mauritanica, Oliv. ii. 28, p. 1, Pl. V., fig. b.c., Mun. Cat. 1648.

Spain; Mus. Brus. ♂. [Guer.] Tavira; ♀.

I have not seen any specimens of this from the African coast, and I very much doubt the correctness of the synonymy. The female is similar to that of *mauritanica*, Lin., but has rudimentary elytra. I have not seen specimens of that species from the European side.

Lampyris mauritanica, Lin. Syst. Nat. ii. p. 645; Fab. Syst. Ent. p. 202; Ol. Ent. ii. 28, p. 13, Pl. I., fig. 5. ♂, ♀.

Algiers; Mus. Brus., Gorh., Chev., Brit. Mus., &c. Tangiers; Mus. Brus.

The only female which I can refer without doubt to this species is from Algiers, and has no rudiments of elytra; while females from Spain and Portugal, which I think referable to *Reichei*, J. D., have rudimentary elytra, and a well-developed scutellum. The male has the dorsal segments of the abdomen with acute, produced hind angles, especially the two before the last; the apex is narrow and rounded.

Lampyris depressiuscula, Mots. Etud. Ent. iii. p. 19.

Circassia; Mus. Brus.

I have not seen authentic specimens of any of Mots.' Eastern species, and refer two specimens in Brusse's Museum with some doubt to this.

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Lampyris marginipennis, Bohem. Ins. Caff. i. 2, 439.

South Africa (Natal, Orange River, &c.); Brit. Mus., coll. Gorh., Hudd., &c.

Obs.—All the South African species of this genus which I have seen have the under side of the body wholly pale yellow.

Lampyris nigripennis, Bohem. Ins. Caff. i. 2, 440; *nec* Mots.

,, Nigrita Gemm., Mun. Cat. 1648.

South Africa, coll. Gorh., Hudd.

Lampyris Huddi, n. sp.

Flavo-testaceus, elytris fuscis, abdomine dimidio brevioribus, apicem versus attenuatis thoracis margine reflexo, disco postea bifoveolato.

Long. lin. 7. ♂.

Very distinct by the abbreviated elytra, which scarcely cover half the abdomen; the wings are ample; the first four segments of the abdomen pale fuscous; legs yellow, tibiæ and tarsi infuscate. Eyes very large, antennæ yellow.

Hab.—India, Bombay; coll. Hudd.

Lampyris marginella, Hope, Gray Zool. Misc. 26.

India, Nepal; Brit. Mus. (*Type*), coll. Gorh.

Rather referable to *Diaphanes* than *Lamprorhiza*. The form is that of *Lampyris*, the luminous segments and transparent areolets of the thorax as in *Diaphanes*.

LAMPRORHIZA, Jacquelin Duval.

Type, *L. splendidula*, Lin.

Lamprorhiza splendidula, Lin. Syst. Nat. i. 2, 644.

Europe, France, Belgium, Germany, Austria. Not in the North. All collections. ♂. ♀.

Obs.—Fifth and sixth segments luminous, eburated in ♂; pygidium rather deeply emarginate.

Lamprorhiza Boieldieni, Jac. Duv. Mon. i. 17.

France; Gorh. (Plason). ♂, ♀.

Obs.—Sixth ventral segment with a small luminous spot, pygidium emarginate in ♂.

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Lamprorhiza Delarouzeei, Jac. Duv. Mon. i. 18.

France (?), "Gabon;" Gorh. (from Chevr.). ♂.

Obs.—Fifth and sixth segments with irregular brownish-yellow markings.

Pygidium deeply emarginate, the middle of the excision with a triangular lobe.

PHOSPHÆNUS. Cast. Ann. Fr. 1833, p. 138.

Pygidium in the male deeply cut out, sides of the excision sinuate, ventral apical plate small, acuminate.

Phosphœnus hemipterus, Geoffr.

Europe generally, not in the North. All collections. Its occurrence in England is at least doubtful.

AMYTHETES. Illiger Mag. vi. p. 342.

Pygidium with apex bisinuate.

Amythetes apicalis, Germ. Ins. spec. nov. p. 67; Mots. Etud. Ent. 1854, p. 25;
præusta, Blanch. Voy. d'Orb. Ent. 124?

Brazil; coll. Gorh., without locality.

Amythetes fastigiata, Ill. (Indescript). ?

Picea, nitida, fortius subrugose punctata, scutello, prothoracis elytrorumque marginibus, et suturâ pallidis, thoracis disco canaliculato angulis posticis acutis.

Long. lin. 5—5½.

The three apical ventral segments are white and eburated, very shining.

Rio Janeiro; Mus. Brus., coll. Gorh., Bahia; Gorh.

MEGALOPHTHALMUS, Gray, Griff. An. Kingd. I., 371.

Megalophthalmus Benetti, Gray loc. cit.

Columbia; Brit. Mus. (Type.)

Megalophthalmus costatus, Cast. Essai. p. 132,
obsoletus, Blanch. Voy. d'Orb. 123; Pl. 7, fig. 7.

Bolivia; Mus. Brus. [Guér. Men. Types.]

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Megalophthalmus collaris, Guérin, Rio. Zool. 1843, p. 18.

Columbia ; Mus. Brus. (Type.)

Obs.—Resembles an *Amythetes*, but the antennæ are eleven jointed, with equal lamellæ, and are not more than twice the length of the head and thorax. The elytra are pitchy black, with slightly raised nervures. The thorax is pale, tubercularly elevated on each side of the disc, miniate ; scutellum pale, whitish. The abdomen of the type is gone.

Megalophthalmus marginatus, Guérin, Wien. Verzeich. v. p. 579.

Columbia ; Mus. Brus. (Type.)

Megalophthalmus melanurus, Cast. Essai. 131.

Peru ; coll. Gorh. [Norris]. Chili ; Mus. Brus.

Obs.—This species does not belong to the genus ; it will, I think, come near *Lucidota*. I have only seen two specimens, which vary in size, one being 3, the other 5 lines in length.

Megalophthalmus Guatemalæ, n. sp.

Niger, opacus, elytris tricostatis, costis duabus exterioribus ad apicem conjunctis, prothorace fulvo, disco carinato, utrinque tuberculato, margine elevato. Scutello flavo.

Long. lin. 3½—4. ♂.

Allied to *M. costatus*, Cast., differs in being more linear ; in having the disc of the thorax scarcely darker, not infuscate ; by the antennæ being quite black, as well as the legs (with the exception of the anterior coxæ, which are yellow). The first costa on the elytra terminates rather more than one-third from the apex, the second and third (the humeral one) coalesce shortly before the apex, which the single branch reaches, in which respect this species differs from *costatus* or *obsoletus*, but resembles *collaris*, with the exception that the apical branch is there very short and evanescent. I am not able to decide certainly which is the luminous segment, but it seems to be the fifth ; it is reddish brown at the base and eburated white at its apical margin. The pygidium is lobed at the sides, rounded at the apex.

Guatemala, Zapote ; coll. Godman and Salvin.

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LUCIOLA, Castelnau, Ann. Fr. 1833, p. 146.

Type *L. Italica*, Lin.

Sexual distinctions not apparent in the European species; at least all the specimens I have examined have only six ventral plates, and may be all female. In the Eastern species seven ventral plates are clearly distinguishable. In *ovalis*, Hope, the three apical in the male are luminous, and are yellow, glabrous, diaphanous; the fifth is short; the sixth nearly twice the length of the fifth, and has a deep longitudinal line giving it the appearance of being cleft. The apical is produced in the middle. The female has six ventral plates, the two last diaphanous, the apical longer than in the male, but similarly produced.

Luciola Italica, Lin. Syst. Nat. i. 2, p. 645.

Europe, Italy. All collections.

Luciola lusitanica, Charp. Hor. Ent. p. 194,
italica, Fab.

Europe, Mediterranean district, Portugal (Cintra), Mus. Brus.; Southern Italy, Corfu, Plason; most collections.

Luciola mingrelica, Ménétr. Cat. rais. p. 161,
mehadiensis, Fald., Dej., Jacq. Duv., &c.

Hungary; [Plason]. Asia Minor, shores of Black Sea, &c.; coll. Gorh., Lagodiche; Mus. Brus.

Obs.—Very nearly allied to *lusitanica*, blacker elytra, with more distinct nervures.

Luciola græca, Cast. l. c. 147.

Syria, Mus. Brus., Constantinople.

Luciola discicollis, Cast. l. c. p. 147.
mendax, Dej. Cat.

Senegal; Mus. Brus.

Luciola puncticollis, Cast. l. c. p. 148.

Senegal; Mus. Brus., coll. Gorh.

Obs.—Castelnau distinguishes the sexes, remarking that the males have two, the females three luminous segments. As the body beneath is wholly yellow I cannot follow this distinction.

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Luciola Caffra, Boh. Ins. Caff. i. 2, p. 445 ?

Zambesi ; coll. Gorh.

Two specimens doubtfully referred to this; the elytra are pitchy and margins and suture testaceous, they are scarcely costate.

Luciola Goudoti, Cast. l. c. p. 150,
Cribricollis, Klug. Ins. Mad. 1833, p. 69.

Madagascar ; Mus. Brus., [Guérin]; coll. Gorh.

Luciola Madagascariensis, Guér. Mag. Zool. 1830, t. 22.

Madgascar ; coll. Gorh.

Luciola plagiata, Erichs. Nov. Act. Ac. Cur. xvi. 2, p. 231 ?

Philippine Isles ; coll. Gorh.

Luciola vespertina, Fab. Syst. El. ii., p. 103.

India, Assam ; coll. Gorh.

Sexual characters are visible here. Fabricius describes the male, in which two segments are white, the apical almost semicircular ; in the female the eyes are much smaller and the subapical ventral plate deeply cut out.

The species which I refer to this is about six lines in length; the thorax is transverse and its hind angles produced and acute; the basal portion of the abdomen is infuscate in the female. A species in my own collection and in that of the Brussels Museum from Madras, Bombay and Bengal, differs in being smaller (three and a half to four lines); the thorax is not so wide and its angles are nearly right ; while a third species, from Malacca and Madras, is much smaller and has the elytra obliquely truncate at the apex.

I propose, then, provisionally to separate the various species which are allied to, and rather closely resemble *vespertina*, F., as follows :—

1. *Vespertina*, Fab. Head black, prothorax channelled in both sexes, elytra very closely punctured but not striate, one or two nervures visible, anterior tibiæ dark, middle pair infuscate in part, hind pair yellow.

2. *Substriata*, n. sp. Head black, prothorax with a fine raised medial line, elytra closely punctured, with the punctures becoming arranged in rows, nervures not distinguished, but the interstices a little raised. Tibiæ all yellow.

Bombay.

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3. *Affinis*, n. sp. Very near No. 1. Smaller and hind angles of thorax not produced, elytra punctured as in No. 1, but two nervures more clearly visible, prothorax channelled. Tibiæ as in No. 1.

Madras [Murray], Bombay, Bengal, Mus. Brus.

4. *Malaccæ*, n. sp. Smaller and more parallel than either of the preceding, thorax scarcely wider than long, channelled, hind angles right but rounded off a little, sixth ventral segment in the ♀? with a deep circular emargination of each side, the portion between lobed and curved upward to meet the pygidium, its own apex being angularly emarginate. The apical margin and central lobe have rather long ciliæ of grey pile. Four specimens from Malacca in my collection agree with the description above, while two from Madras have the eyes smaller; one of them having the same curious structure of the abdomen, the other having seven ventral segments, the sixth widely emarginate, the seventh small, with a central lobe excised at its apex, of the same form and ciliated as in the ♀?

5. *Chinensis*, Lin. Syst. Nat. I. 2, p. 645? This is certainly very close to No. 2, but the thorax has more distinct hind angles, and is channelled, not with any raised line; the tibiæ are black except at their extreme base, and the apex of the elytra with a very small black spot.

Foochow [Lewis]; coll. Gorh.

6. *Præusta*, Escholtz. Antennæ yellow, thorax channelled, elytra very obsoletely punctured and with hardly any trace of nervures.

Philippine Isles, Manilla; Mus. Brus. ♀? coll. Gorh. ♂?

Obs.—The ♂ has the sixth seg. excised, the seventh acuminate.

Luciola tabida, n. sp.

Pallide testacea, antennis articulo basali excepto, elytrorum apice tarsisque infuscatis, thoracis angulis posterioribus rectis, basi depresso submarginato.

Long. lin. 5. ♀.

Head yellow, eyes small, received into the prothorax. Elytra clothed with a fine white pile, apex with an indeterminate fuscous spot. The subapical segment of the abdomen is emarginate, the segment preceding *margined with black.*

Fernando Po; coll. Gorham [Waterhouse].

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Luciola pallescens, n. sp.

Pallide testacea capite, antennis, tibiis anticis tarsisque fuscis, thorace perbrevi, disco convexo angulis posticis productis, acutis, maculis tribus unâ discoidali, duabus basalibus, et margine frontali piceis, elytris crebre punctatis apicem versus attenuatis, pube griseo tenuiter vestitis.

Long. lin. 7. ♂, ♀.

Mas.—Abdominis segmento ventrali apicali semicirculari.

Femina.—Segmento sexto profunde exciso, septimo bicarinato.

Readily recognised by its large size and depressed form; the antennæ in the male are about half the body's length. The last three segments are shining, and paler than the rest of the abdomen, and are no doubt the luminous portion.

Java; ♂ coll. Gorh.; ♀ Mus. Brus. [Dr. A. Breyer].

Luciola costipennis, n. sp.

Flavo-testacea, capite, antennis, pedibus (femorum basi exceptis), apiceque, nigris, elytris costâ humerali distinctâ, ad apicem fere provectâ.

Long. lin. 3.

Clear testaceous yellow, about the size of *L. Goudoti*, thorax transverse subquadrate, a little narrowed at the anterior angles, channelled, hind angles very slightly produced backwards; deeply punctured, but not so coarsely as the elytra, in which the punctures are large, ocellated, and sometimes confluent; the humeral costa is very raised, and divides the elytron into two flat areæ; the suture and margin are both raised.

China, Foochow [G. Lewis]; coll. Gorh.

Obs.—This species belongs to the *vespertina* group, but is so easily distinguished by its costate elytra I have thought it better to keep it separate.

Luciola picticollis, Kiesenwetter.

Lewis, Cat. Col. Japan, 1204.

Japan [G. Lewis]; coll. Gorh.

Obs.—E. von Harold, Deuts. Ent. Zeit. 1877, p. 357, says both this and the following = *cruciata* Mots. They are however distinct from each other, and it is scarcely

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likely that either = a species which is from Java. There are, moreover, discrepancies between *picticollis* and *cruciata* in the description given by Mots. The femora in the Japanese species are not yellow at the base, and the length of Mr. Lewis's species is 7 lines. The male has the abdomen as in *cruciata, sec. Mots.* The female has the fifth and sixth segments yellow and short, the apical very small and black.

Mr. Lewis includes *præusta,* Esch. Kies ?, *cruciata,* Mots., *lateralis,* Mots., and *japonica,* Thun., as separate species occurring in Japan, in his catalogue. There is evidently some error here. The latter is given as synonymous with *chinensis,* Lin. in the Munich catalogue.

Luciola vitticollis, Kies. Lewis, Cat. Coll. Jap. 1203.

Three and a half lines long, more opaque than the preceding; thorax even, not channelled, rosy, with a broad vitta, widest at the apex and base.

Japan [Lewis]; coll. Gorh.

Luciola ovalis, Hope, Gray's Zool. Misc. 1831,
circumdata, Mots. Etud. Ent. iii. 1854, p. 50.

The singular structure of the abdomen has been noticed in the prefatory remarks on the genus, p. 99.

India; coll. Hudd, Gorh., &c., Assam; Mus. Brus., Brit. Mus. ♂, ♀.

Luciola indica, Mots. Etud. Ent. iii., p. 53.

India; Andaman Isles; coll. Gorh.
Bombay; Mus. Brus. [Guérin].

Luciola xanthura, n. sp.

Elongata, depressa, sordide testacea, suturâ apiceque elytrorum flavis, capite nigro, antennis, thoracis disco, abdomineque fuscis, hoc segmentis duobus apicalibus maris albis, eburatis.

Long. lin. 3. ♂.

Thorax with the base truncate, hind angles right, disc strongly punctured; elytra obsoletely punctured, nervures visible, but faint.

India, Neilgherry Hills; Mus. Brus. [Guérin].

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Luciola carinata, n. sp.,
striata Lat. ? Dej. Cat. nec. Fab.

Feruginea, elytris flavis, interstitiis fusco-irroratis punctato-striatis, suturâ, lineis quatuor, et margine elevatis, antennis (basi excepto), thoracis disco, maculis duabus, abdominis segmento quarto ad marginem, tarsisque nigris.
Long. lin. 5.

This species may be at once known by the orange-yellow colour, the two distinct spots on the middle of the thorax, and the singular evenly carinate elytra. The suture and two first carinæ are moderately raised; the two second pale lines start from the raised humeral callus, but are scarcely elevated lower down; all the lines unite with the pale margin of the base, but only the suture and margin are connected at the apex. The ventral apical plate is long, and somewhat triangular, with a fovea on each side at the base, and a pale triangular spot in the middle of the base.
Java; Mus. Brus. [Guérin].

Luciola australis, Fab. Syst. Ent. p. 201.

Very close to *indica*, Mots. The only difference I can see being that the tibiæ are black, and that the suture and margins are not inclined to be pale, as in some specimens of *indica*.
Port Denison; Mus. Brus. [Simson].

Luciola spectralis, n. sp.

Supra pallide flavo-testacea, capite sordide flavo, antennis, thorace maculis duabus magnis, elytrorum apice latius, corpore pedibusque nigris, his basi, illo segmentis quinto et sexto flavis.
Long. lin. 5½ ♂ ?

Thorax obsoletely channelled, clothed with yellow pile, hind angles acute, scarcely produced. Elytra with four costæ. The black colour of the apex not very pronounced, and the yellow extends along the suture and margin. Punctuation of the elytra close but distinct, the pile very short but close.
New Zealand; coll. Gorham. A single specimen.

Luciola discoidea, n. sp.

gratiosa Dej. Cat.

Sordide fusca; thorace flavo, disco late nigro, capite, abdominisque basi nigris, elytris fuscis flavocinctis.
Long. lin. 3. ♂, ♀.

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Head black, antennæ of half the length of the body, fuscous, thorax closely subrugosely punctured, transversely, subquadrate, front angles rounded, hind angles sub-acute, base sinuate.

The male has the two apical, the female the sub-apical ventral plates white, shining, and diaphanous.

Senegal ? ; coll. Gorham.

Obs.—I am not sure of the locality ; this species may be the same as *discicollis*, Cast.

PHOTURIS, Leconte, Proc. Ac. Phil. v. 337.

Type, *P. pennsylvanica*, De Geer.

The determination of the species of this genus is attended with almost as much difficulty as those of *Photinus*. The adoption of Dejean's catalogue names is one principal cause of the confusion that exists. Motschulsky gives *hectica*, Fab., as the type of *Photuris*, Dej. No doubt it would have been well if Leconte had taken one of the larger tropical species for a type ; but it is more than doubtful if Dejean's reference of *hectica* was correct, for I do not think it possible to join his *biguttata* with it. Hence I think it necessary to consider the North American species the type. I think the best plan is to reject the Dejeanian names altogether. I give references to his names for the sake of those collections that have them, but it must be uncertain whether they refer to the same species or not. It must ever be a misfortune to have had them at all.

The genus will divide into sections by the structure of the claws : Sec. I.—Claws simple. Sec. II.—Claws split in the male, simple in the female. Sec. III.—External claw split. Sec. IV.—All the claws split.

All these agree in having a Telephoroid aspect. The head is exserted, the elytra very soft, and apt to curl up when dry ; the thorax, however, is, unlike that of *Telephoridæ*, semicircular, with hind angles usually produced, and the diaphanous segments are very conspicuous and white. In Sec. I. I cannot discover the sexual distinction, unless it is in some species in which one sex has only a luminous spot on the fifth plate, the other the whole of the fifth and sixth luminous. In Secs. II. and III. the males have larger eyes, and the apical ventral plate produced into a long acuminate lobe, reaching the apex.

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Sec. I.—Claws simple, a luminous spot, or two segments luminous.

Photuris hectica, Fab. Syst. El. ii. 102.

The species I refer to this is testaceous above, with black head and abdomen, one luminous spot; the legs, antennæ, and three spots on the thorax are also black. This is the only species I have seen at all agreeing with the Fabrician description.

Brazil; coll. Gorham.

Photuris moesta, Germ. Ins. spec. nov. 65.

Black, a little shining, lateral margin of elytra terminating before the apex, white; head, crown, and mouth black, yellow below antennæ, pleuræ of the prothorax and reflexed margin of elytra yellow. One yellow spot on fifth, or middle of fifth, and whole of sixth segment yellow. Pygidium and ventral apex entire, acuminate, in some specimens with one spot, the ventral apex is notched. ♀?

Brazil; Rio Grande, coll. Gorh., Mus. Brus.

Photuris tristissima, n. sp.
limbata, Dej.?

Very nearly allied to *moesta*, and perhaps not distinct; chiefly distinguished by having the margin pale to the apex, and the suture and lateral margin of the thorax pale. It is duller, and rather fuscous than black. The fifth segment in the ♂ ? is often wholly white as well as the sixth.

Brazil; coll. Gorh. Rio Janeiro, Mus. Brus.

Obs.—The thorax has sometimes two red spots, very distinct examples of which are *biguttata*, Dej.

Photuris fumosa, n. sp.
aurita, Dej.

Oblongo-ovata, nigro-fumosa, opaca, thorace lunari angulis posticis acutis, productis, thorace plagis duabus capite infra oculos, et antennarum articulis tribus subtus pallide flavis.

Long. lin. 6—7.

Var.—Elytris vittis duabus sub-marginalibus flavis biplagiata, Dej.

Brazil; coll. Gorh., and Olivier. [Chevr.]

Obs.—A spot on the 5th, and in the *var.* one on the 6th segment also, luminous. ♀?

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Photuris telephorina, Perty Del. An. Art. p. 27, Pl. VI., fig. 3.

A well-known, rather variable species. I have a variety (*dimidiata*) in which the apex of the elytra only is black; a spot on the 5th and 6th segments, or the whole of those plates are luminous.

Brazil; all collections.

SEC. II.—Claws split in the ♂, simple in the female.

Photuris collaris, n. sp.

Nigerrima, sub-nitida, thorace lunari, ore, antennis articulis duobus basalibus læte rufis, pedibus nigropiceis femoribus anterioribus et intermediis brunneis.

Long. lin. 5—7½. ♂, ♀?

The two sub-apical in the male, and the three apical segments in the female are whitish yellow; the sixth emarginate, and the apical notched in the ♀.

Zapote, Guatemala; coll. Godman and Salvin. ♂. Mexico; Mus. Brus. ♀.

Photuris ruficollis, n. sp.

Nigra, thorace lunari, scutello, coxis et trochanteribus anticis rufis.

Long. lin. 5½. ♀.

Very nearly allied to *collaris*; the scutellum is red, the thorax more rounded at the sides, and more opaque than in that species.

In the specimen in my collection, a spot common to the fifth and sixth segments is luminous.

Hab.— ? Coll. Gorh.

Photuris lucidicollis, n. sp.

Fusca, elytris marginibus et suturâ, interdum etiam vittâ discoidali, dilutioribus, thorace lunari margine pallido, disco piceo, canaliculato, utrinque roseo-miniato, angulis posticis acutis retrorsum productis.

Long. lin. ♂, ♀.

Mas.—Segmentis tribus ventralibus apicalibus albis, apicali parvo, medio acuminato producto; unguiculis fissis.

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Femina.—Segmento ventrali apice exciso, nigro, unguiculis simplicibus.

Var.—Elytris nigro-fuscis margine toto tenuiter flavo, corpore nigro.

This species, especially the *var.*, bears some resemblance to *Photinus cincticollis*, Chev. The form of the thorax and its acute hind angles afford a ready distinction.

Guatemala, Duenas, Capetillo; Costa Rica; coll. Godman and Salvin.

Obs.—The specimen from Capetillo is the dark *var.* of the ♀.

The Costa Rica specimen has the ventral apex pale, as the ♂.

Photuris mexicana, n. sp.

Fumeo-nigra, thorace pallide flavo, disco nigro utrinque roseo, antennarum basi, femoribus et tibiis anticis intus, et ore pallidis.

Long. lin. 5. ♂, ♀.

Mas.—Segmentis apicalibus tribus, flavis vel roseis; apicali acute producto; unguiculis fissis.

Femina.—Segmentis tribus apicalibus flavis, apice exciso; unguiculis simplicibus.

Mexico; coll. Gorham, Hudd. and Chevr. [Boucard.]

Photuris amœna, n. sp.

Nigro-fusca, thorace rufo, disco nigro, margine pallido, pectore pedibusque pallide flavis, his genubus, tarsis, et tibiarum apicibus fuscis; elytrorum suturâ tenuiter, margine laterali latius flavis.

Long. lin. 4—5. ♂, ♀.

Mas.—Unguiculis externis fissis, segmento quinto et sexto læte flavis, eburatis, apicali acute producto.

Femina.— Unguiculis simplicibus, segmento quinto maculâ albido-flavâ eburato, sexto et apicali excisis, rufis.

Guatemala, St. Geronimo, and Guatemala City; coll. Godman and Salvin.

Obs.—This has a superficial likeness to *P. frontalis*, Lec., but besides having simple claws in the ♀, the head is black, and it is abundantly distinct.

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Sec. III.—External claw split in both sexes.—*a.* One or two segments luminous.

Photuris latefascia, Mots. Etud. Ent. iii. p. 61.
annuliventris, Dej.
cinctiventris, Chev. Guér. ♀.

In the male *two* segments, in the female *one*, before the apical are white and luminous; the structural characters of the apex are as usual in this genus.

Columbia; Mus. Brus., coll. Gorh.

Photuris axillaris, Mots. Etud. Ent. iii. p. 61.

If I am right in my reference, this is very like *latefascia* in form and details, but the elytra are nearly black, only the middle of the suture and margin being yellow.

Columbia; Mus. Brus. ♂.

Photuris scutellata, n. sp.

Nigra, thorace elytrorumque dimidio basali rufo-ferrugineis, his maculâ scutellari nigrâ.

Long. lin. 6. ♂, ♀.

Mas.—Segmentis quinto et sexto læte flavis, apicali nigro, acute producto.

Femina.—Segmento quinto albido, apice leviter exciso.

Columbia; Mus. Brus. [Guérin], coll. Gorh.

Obs.—This species is labelled "*lycoides*" in my collection from Norris. It is not *lycoides*, Cast. Essai. Ann. Soc. Ent. Fr. ii. 145.

Photuris funestis, n. sp.

Nigerrima, thorace rufo maculâ basali transversâ, angulis posticis acutiusculis, margine laterali reflexo, elytris quintuplo breviore.

Long. lin. 6. ♂, ♀.

Mas.—Segmentis quinto et sexto læte flavis, emarginatis; apicali nigro, acute producto.

Femina.—Segmento quinto albido.

Columbia; Mus. Brus. [Guérin].

Of similar form with the three preceding species, which all have the thorax very small compared with the length and amplitude of the elytra; the eyes of the males are rather large and prominent; the luminous segments are particularly conspicuous, and not clouded in either sex.

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Sec. III.—*b*. Three segments luminous.

Photuris pennsylvanica, De Geer. Ins. iv., p. 52.

This species, or very closely-allied varieties which I am not at present able to separate, has a very extended range, from Canada to the equator. Specimens of the typical form have the elytra dark fuscous brown with pale margins, suture, and a single vitta starting from the humerus and varying in length. This form appears to be *Telephoroides vittigera*, Mots.

Canada, Montreal, Quebec, &c.; U. S. Michigan, Pennsylvania, &c.; Guatemala, Zapote; all collections.

Var.—*a*. Elytra nigro-picea, margine et suturâ tantum flavis. *T. lineatocollis*, Mots., Quebec. Mus. Brus., "Am. bor."; coll. Gorh.

Var.—*β*. Latior, pallidior, elytris strigâ pallidâ intervittam humeralem et suturam, alterâque ante marginem.

Mexico; Mus. Brus., coll. Gorh., Guatemala, Zapote, Capetillo, San Geronimo; Nicaragua, Chontales; Costa Rica; British Honduras, Rio Sarstoon; coll. Godman and Salvin.

Var.—*γ*. Elytris totis fuscis.

Antilles; Mus. Brus.

Var.—*δ*. Minor, elytris et thorace sordide fuscis.

Antilles; Mus. Brus.

Var.—*ε*. Tota pallida, elytris vittis et marginibus ægre distinctis, dilutioribus.

Columbia; Mus. Brus., Guiana; Demerara; Costa Rica; coll. Gorh., Panama; Chiriqui; coll. Godman and Salvin.

The male has larger eyes, two segments before the apical eburated, yellowish, and emarginate; the apical produced but not spiniform.

Photuris frontalis, Leconte Proc. Ac. Phil. v., p. 337, 1852.

United States, Texas. ♂ coll. Gorh.

Thorax coarsely punctuate, hind angles scarcely produced, male with the two subapical segments deeply emarginate, head yellow.

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Photuris fruticola, Escholtz. Mots. Etud. Ent. iii., p. 60,
tibialis Dej.
trivialis Bohem. Res. Eugen. 1858, p. 77.

Guatemala, Zapote; coll. Godman and Salvin, Brazil; Parana; coll. Gorh., Monte Video; Mus. Brus. ♂, ♀.

Thorax shining, immaculate; the elytra vary in depth of colour, the head is usualy black, or partly so.

Photuris mollis, n. sp.

Sordide livida, capite, antennis, tibiis, tarsis, thoracis disco, elytrisque fuscis his margine, in medio latius, et suturâ tenuiter pallidis.

Long. lin. 3½—4. ♂, ♀.

Head with the concave crown black, becoming testaceous towards the mouth; antennæ fuscous except at their insertion, prothorax shining, obsoletely punctured, the disc pitchy, base sinuate, hind angles hardly produced; elytra of a dull leaden hue, finely pubescent, not much wider than the prothorax; coxæ and femora pale; the margin of the fourth and the three following ventral segments entirely whitish. Sexual characters normal.

Guatemala, Zapote; coll. Godman and Salvin.

Photuris brunnipennis, Jacq. Duv. Hist. Cubæ, vii., p. 89.

Cuba; coll. Chevrolat [now Olivier], who sent me the ♂. Resembles *fruticola*, but more pubescent, and head yellow; the suture and margins are widely testaceous in their middles.

Sec. IV.—All the claws split (in both sexes ?)

I have not seen a female of the only species known to me in this section. The male has the apical segment acutely produced, the fifth and sixth are yellow, eburated, and with the punctiform stigmata distinct.

Photuris lividipennis, Mots. Etud. Ent. iii., p. 58.

Brazil ? coll. Gorh. [Norris.] ♂.

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Explanation of Plate I.

In all the figures *a* is the dorsal, and *b* the ventral surface of the apex of the abdomen.

Fig. 1. Lamprocera Latreillei, *Kirby*. ♂.
„ 2. Hyas denticornis, *Germ.*, ♂ and ♀.
„ 3. Cladodes flabellicornis, *Mots.* Sex uncertain.
„ 3*a*. Cladodes lamellicornis, *Mots.* Sex uncertain.
„ 4. Phænolis laciniatus, *Gorham.* ♂? *c, ventral apical plate enlarged.*
„ 5. Vesta Chevrolatü, *Cast.* ♂.
„ 6. Lucernula fenestrata, *Germ.*
„ 7. Æthra concolor, *Gorham.* Sex uncertain, *ventral.*
„ 8. Lucidota flabellicornis, *Fab.* ♂.
„ 9. Alychnus xanthorrhaphus, *Kirsch.* ♂ and ♀.
„ 10. Lucidota apicalis, *Gorh.* ♂
„ 11. Lucidota discolor, *Gorh.* ♂
„ 12. Photinus coruscus, *Lin.* ♂ and ♀, *ventral.*
„ 13. Photinus longipennis, *Mots.* ♂ *a* and *c*, ♀ *ventral.*
„ 14. Pyreetomena striatella, *Gorh.* ♂ and ♀ *ventral*
„ 15. Cratomorphus giganteus, *Drury.* ♂ and ♀.
„ 16. Cratomorphus diaphanus, *Germ.?* ♀.
„ 17. Cratomorphus bifenestratus, *Gorh.* ♀.
„ 18. Cratomorphus insignis, *Gorh.* ♂.
„ 19. Hyas angularis, *Gorh.* (*Chev.*).
„ 20. Alychnus xanthorrhaphus, *Kirsch.* ♀.

The figures are all a little enlarged.

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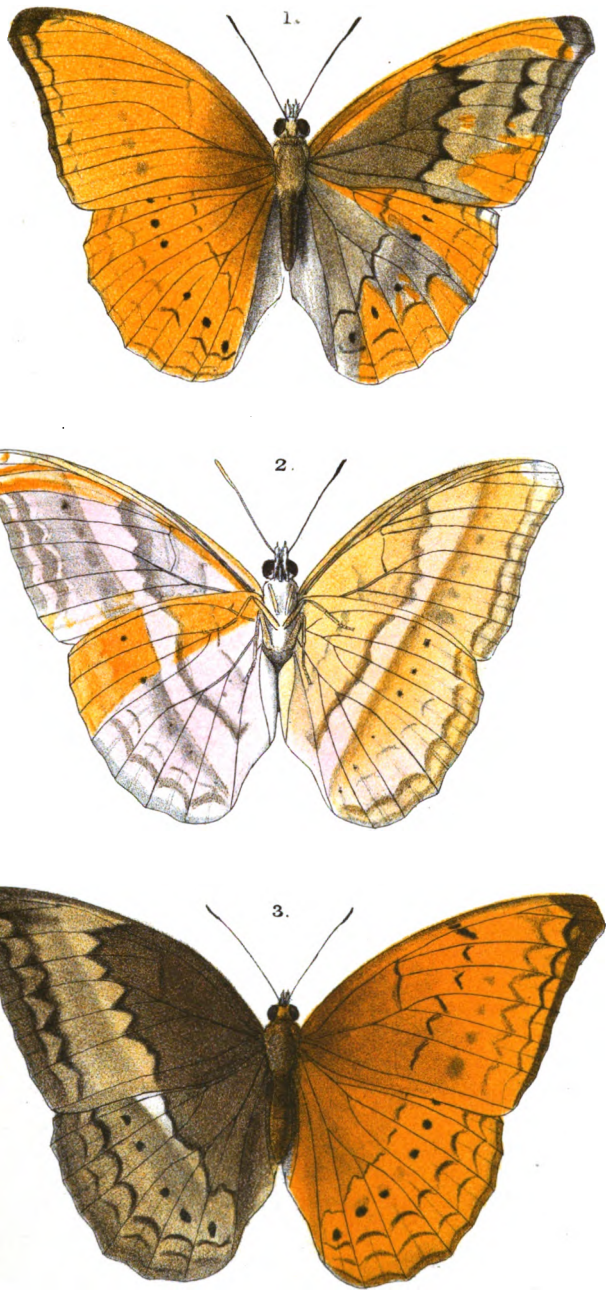

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IX. *On two Gynandromorphous specimens of* Cirrochroa Aoris, Doubleday, *an Indian species of Nymphalideous Butterflies.* By J. O. Westwood, M.A., F.L.S., &c.

[Read April 7th, 1880.]

Plate II.

The term Gynandromorphism was first applied by M. Lacordaire to supersede in entomology that of Hermaphroditism, the latter term being more strictly applicable only to those animals in which the generative organs of both sexes are normally included in the same individual, but which, nevertheless, require the presence of a second individual of the same species to effect the joint impregnation of the two individuals. In insects, gynandromorphous specimens, partaking abnormally of the character of both sexes, are generally bilateral; the sexual distinctive characters (which are for the most part in these instances the *secondary* ones) of one sex being exhibited on one side of the body and its organs, and the peculiarities of the opposite sex being seen on the other half of the insect. Of this bilateralism many instances have been recorded, and most extensive collections can boast of the possession of one or more of such "half-and-half" monsters. Here the gynandromorphism may be termed *complete*, but specimens of far greater rarity, in which the abnormality is only *partial* (of which no notice occurs in any of the hitherto published introductions or general works on the science), are now known; and in my *Thesaurus Entomologicus* I collected together a number of instances in which, whilst the body of the insect appears to be unisexual, the partial sexual divarication is confined entirely to the *secondary sexual characters*, exhibited by one or more of the wings only. The peculiar import of this strange modification in a physiological point of view is very difficult to be understood, and from the great rarity of the individuals, and their small size, we can hardly hope to obtain specimens sufficient for the necessary examination of the characters of the primary and internal sexual organs.

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The specimens exhibiting this partial gynandromorphism hitherto observed, belong, for the most part, to the Diurnal Lepidoptera, in which the sexual variation in the markings and coloration of the wings quickly catches the eye. Doubtless, however, they are more numerous than has hitherto been supposed. But they are of course liable to be overlooked in the vast multitude of species of all orders where the external sexual distinctions are not conspicuously distinct.

The individuals figured in the 35th plate of my *Thesaurus Entomologicus* (in addition to Mr. George Semper's specimen of *Papilio Pollux* figured in the Wiener Ent. Monatschr. Bd. vii. pl. xix., from India) are *Pieris Pyrrha* in Mr. Hewitson's collection, in which the pair of wings on the left side and the anterior right wing are male, whilst the hind right wing exhibits a mixture of the female brightly-coloured markings, especially towards the outer angle. Several specimens of *Euchloe Cardamines* are figured, in which patches of the male orange colour appear on one of the wings, otherwise female; specimens also of *Anthocharis Evippe*, *Gonepteryx Rhamni*, *Siderone Isidore*, *Hipparchia Semele*, *Morpho Sulkowskyi*, *Polyommatus Adonis*, and *Lasiocampa quercus* are described and figured together with a specimen of *Calepteryx Virgo*, in which the right hand fore wing is irregularly marked with the sexual colours. The specimen of *Hipparchia Semele*, in Mr. F. Bond's cabinet, in size and general appearance, as well as in the structure of the fore legs, is a male insect, but the left fore wing does not exhibit the peculiar rugose portion of the disc (as seen in the male) to its full extent, whilst the apical portion is marked as in the female. Mr. Bond also possesses a male specimen of the same species of butterfly having the apical half of all the wings marked as in the female.

In this species of *Hipparchia* the secondary sexual character of the wings is not confined to the colour or markings, but extends also to the clothing of the wings, the greater portion of the disc of the fore wing being covered with ordinary shaped oval scales, which are affixed to the wing in little cups placed transversely in rows at equal distances apart; but in the rugose portion of the fore wings (characteristic of the male) the membrane of the wing is covered quite irregularly with a vast number of the small cups, the characteristic male scales, or plumules (as they are termed by microscopists), occurring in these parts in vast numbers.

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These plumules are either of a very elongated oval form, or are almost linear, with the surface of the scale, however, striated, and the apex terminating in a small tuft of very fine bristles. These scales are implanted in the cups by a minute bulbous base, from which extends a short, extremely slender, cylindrical portion. Although, however, occurring in such vast numbers, these scales are not observed when the insect is at rest, or dried in a cabinet, the roughness which is observed in those parts of the wings being produced by the usual oval scales implanted amongst them, sticking up as if thrust upwards by the dense mass of male plumules beneath.

Cirrochroa Aoris, Doubleday and Hewitson Gen. D. Lep. Pl. XXI., fig. 1, is a handsome butterfly belonging to the family Nymphalidæ, inhabiting Assam, Sylhet, and the adjacent parts of India, which was sent to me by Major Jenkins, and of which numerous examples are contained in the British Museum and Oxford collection. The male has the upper side of the wings of an uniform orange colour, with a narrow indistinct oblique stripe across the discoidal cell of the fore wings, followed by an undulated, slightly defined narrow line extending obliquely from the costa of the fore wings to the anal margin of the hind ones; the tip of the fore wings is black, with a submarginal row of lunules, which become nearly obliterated towards the posterior angle, the outer margin being also brown. The hind wings are marked beyond the middle with an oblique row of small round blackish spots, the space between the third branch of the median vein and the discoidal one being without the spot; these are succeeded by two rows of narrow dark lunules parallel with the outer margin, which is also dusky. On the underside the markings are more varied, the ground colour of the wings being paler buff, with a subcentral pearly whitish bar, having an irregular inner and a straight outer margin; the tip of the fore wings is also whitish, the rows of lunules of the upper side being but faintly represented beneath.

The female is much more varied on the upper surface than the male, the ground colour of the wings being ashy buff, with all the markings of the male much darker and better defined, the middle of the wing being traversed by an irregular pale buff band, edged internally with an angulated blackish line; the outer margin of the wing and its markings are also much darker.

Of this species there are two specimens in the British

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Museum collection, which exhibit the two varieties of gynandromorphism above described. In one of these specimens the gynandromorphism is exactly bilateral, the wings on the right side of the insect having the colouring and markings of the male strongly defined, whilst the wings on the other left side are those of the female equally strongly marked. The body is small and shrivelled, having the appearance of a male, but the fore leg on the left side is clearly masculine.

The other specimen is clearly a male insect, as it possesses the brushed fore-legs and the slender body of this sex, the wings on the left-hand side being also normally masculine. Those of the right side, on the other hand, exhibit a singular mixture of the characters of the two sexes. On the upper side the fore-wing has the costa, together with a narrow stripe along the fore-margin of the discoidal cell of bright orange, this colour extending to the tip of the wing, the outer posterior angle of which has also broad orange, extending into the space along the apical margin between the second and third branches of the discoidal cell, which space is further marked by two little orange dashes near the base, and a single one beyond its middle. The basal part of the rest of the wing and the middle extending to the central portion of the apical margin is marked as in the female. On the hind-wings the costal portion extending nearly to the discoidal vein is broadly orange, which colour is also seen occupying a large portion of the wing from the middle of the outer margin nearly to the anal angle, extending upwards between the first and second branches of the median vein to the subcostal row of dark lunules. The remainder of the wing is feminine.

On looking at the insect from beneath, the two right-hand wings are masculine, whilst the fore-wing on the opposite side is almost entirely female, with some longitudinal orange streaks along the costa as above, and some slight orange rather indistinct marks on the external margin. The hind-wing on this side is curiously divided in its colours, the costal portion being broadly masculine, whilst more than half the wing is female.

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Explanation of Plate II.

Fig. 1. *Cirrochroa Aoris*, exhibiting partial gynandromorphism of the wings on the right-hand side of the insect, seen from above.

„ 2. The same specimen, seen from beneath, showing the partial gynandromorphism confined chiefly to the costal area, and towards the anal angle of both fore and hind wings.

„ 3. *Cirrochroa Aoris*, exhibiting complete gynandromorphism, the wings on the right side being male, and those on the left female; ordinary character of both sexes.

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W.Purkiss lith.

Hanhart imp.

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X. *A List of Diurnal* Lepidoptera *collected in the Sierra Nevada of Santa Marta, Colombia, and the Vicinity.* By F. Du Cane Godman and Osbert Salvin.

(Plates III. and IV.)

[Read July 7th, 1880.]

There are few parts of South America the zoology of which has been less studied than the group of mountains in the extreme north of Colombia, known as the Sierra Nevada of Santa Marta. Though visited at rare intervals by botanical travellers, this district was comparatively untouched by any zoologist until Mr. F. A. A. Simons undertook its exploration; and reaching his destination early in 1878, is still at work in the country. Of the butterflies he has sent us from time to time we now proceed to give a list, with descriptions of such species as appear to us to be new, adding a few notes on the more interesting known ones. In the *Proceedings of the Geographical Society* for 1879 (pp. 689—694), Mr. Simons has published a description of the various places visited by him, all of which are shown on a map accompanying his paper.

The Sierra Nevada itself is a group of mountains attaining an elevation of about 18,000 feet above the sea level, and, as its name implies, has its summit covered with perpetual snow. The connection between this mountain mass and the northern spur of the Andes, which passes to the eastward of it, is made by a range of hills, the height of which probably does not exceed 1,000 feet, so that the Nevada itself, and all the higher slopes of the mountain, are completely isolated from the rest of the Andes, and therefore highland forms of species allied to those of the Andes might be expected to exist in this district. This Mr. Simons's collections have proved to be the case, though we are certainly surprised to find the butterfly fauna so comparatively poor. Still, of the eighty species collected in the mountain nine appear to be new and undescribed, most of which are probably peculiar to this restricted area. Mr. Simons describes the greater part of the country as

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open savanna, with but few trees and barren hill-sides, the forest, of small extent, being restricted to the neighbourhood of the mountain called Chinchicua, which reaches an elevation of 11,000 feet, a little to the southward of the higher peaks of the Nevada itself. To this scarcity of forest the poverty of the fauna must in a measure doubtless be attributed; but something must also be set down to the difficulties lying in the way of a collector making any length of residence in these high regions. We still hope to see considerable additions to the number of species of butterflies of this district, as in those that have already reached us we trace the elements of a much richer fauna.

Besides working in the Sierra Nevada, Mr. Simons made an expedition to the southward, and spent some time at a place called Manaure, situated on the northern spur of the Andes, at an elevation of 2,700 feet above the sea. Here he found a much richer fauna, as will be seen from the subjoined list. But the peculiar species of the Sierra Nevada do not appear to extend to this district, the butterfly fauna being made up of a mixture of Colombian and Venezuelan forms of considerable range; with these are intermingled a few hitherto only known from Central America, and others we now describe for the first time.

The localities mentioned in the following list are situated as follows:—

MANAURE.

Elevation, 2,700 feet. A coffee plantation south-east of Valle Dupar, on the western slope of the northern spur of the Andes.

CHINCHICUA AND CHINCHICUA VALLEY.

Not given in Mr. Simons's map, but doubtless situated on the slopes of the Chinchicua mountain, which attains an elevation of 11,000 feet, and is situated on the south side of the Nevada. The only forests in the Nevada are situated here.

ATANQUEZ.

Elevation, 2,800 feet. On the south-eastern slope of the Nevada, six hours' journey from Valle Dupar.

SAN SEBASTIAN.

Elevation, 6,700 feet. On the south-western slope of the Nevada.

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PUEBLO VIEJO.

Elevation, 3,700 feet. On the southern slope of Mount Chinchicua.

VALLE DUPAR.

Elevation, 700 feet. The principal town of the district, surrounded by gardens, but situated in a savanna, with no forests in its immediate vicinity.

SAN ANTONIO.

Elevation, 3,700 feet. On the north-eastern slope of the Nevada.

SAN JOSE.

Elevation, 5,000 feet. On the track from Atanquez to the Nevada, situated in the valley of the Rio Gua.

Fam., NYMPHALIDÆ.

Subfam., DANAINÆ.

1.	*Danais eresimus*, Cram...	Manaure.
2.	*Ituna lamirus*, Latr.	Chinchicua.
3.	*Lycorea atergatis*, Doubl. & Hew. ..	Manaure.
*4.	*Melinæa lilis*, Doubl. & Hew.	,,
5.	*Aeria agna*, Godm. & Salv.	,,
6.	,, *elara*, Hew.	,,
7.	*Thyridia edesia*, Doubl. & Hew... ..	,,
8.	*Mechanitis macrinus*, Hew.	,,
*9.	*Ceratinia philidas*, n. sp.	,,
10.	*Napeogenes stella*, Hew.	,,
11.	,, *cyrianassa*, Doubl. & Hew.	,,
12.	*Dircenna euchytma*, Feld.	,,
13.	,, *jemima*, Hübn.	,,
14.	,, *lenea*, Cram...	,,
15.	*Caloleria tutia*, Hew.	Atanquez.
16.	*Leucothyris amalda*, Hew.	Manaure.
17.	,, *hippodamia*	,,
*18.	"*Ithomia*" *cymothoe*, Hew.	,,
19.	*Pteronymia alinda*, Feld.	Pueblo Viejo.
20.	,, *aletta*, Hew.	Manaure.
21.	*Ithomia iphianassa*, Doubl. & Hew...	Atanquez.
22.	,, *lagusa*, Hew.	,,
23.	*Hypoleria lavinia*, Hew.	Manaure.
24.	,, *ocalia*, Doubl. & Hew. ..	Atanquez.
*25.	"*Ithomia*" *giulia*, Hew.	Manaure, Valle Dupar.
26.	*Pseudoscada utilla*, Hew.	Manaure.

Subfam., SATYRINÆ.

27.	*Tisiphone maculata*, Hopff...	Manaure.
28.	*Euptychia ocirrhoe*, Fabr.	San Antonio.
29.	,, *labe*, Butl.	Valle Dupar.
30.	,, *terrestris*, Butl., *var.* ..	,,

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31.	*Euptychia saturnus*, Butl.	Atanquez.
*32.	„ *oreba*, Butl...	Manaure.
33.	„ *camerta*, Cram.	„
34.	„ *batesi*, Butl...	„
*35.	„ *peribœa*, n. sp.	„
36.	„ *herse*, Cram.	Atanquez.
37.	„ *ebusa*, Cram.	Manaure.
38.	„ *lineata*, n. sp.	„
39.	*Taygetis andromeda*, Cram...	„
40.	„ *virgilia*, Cram.	„
*41.	*Lymanopoda cœruleata*, n. sp.	Chinchicua, and between San Sebastian, and Atanquez.
*42.	*Pedaliodes polyxo*, n. sp.	„
*43.	„ *leucocheilus*, n. sp.	„
44.	„ *piletha*, Hew.	„
45.	„ *manis*, Feld.	San Sabastian and Atanquez.
46.	„ *symmachus*, n. sp.	„
*47.	„ *tyrrheus*, n. sp.	„
48.	*Pronophila thelebe*, Doubl. & Hew. ..	„
49.	*Lasiophila zapatosa*, Westw.	„
50.	*Cyrades medeba*, Hew.	San Sebastian.

Subfam., Morphinæ.

*51.	*Morpho rhodopteron*, n. sp.	Pueblo Viejo.
52.	„ *peleides*, Koll.	Manaure, Atanquez.

Subfam., Brassolinæ.

53.	*Opsiphanes tamarinde*, Feld.	Manaure, Atanquez.
54.	„ *bogotanus*, Dist...	„
55.	*Caligo telamonius*, Feld.	Manaure.
56.	*Euryphanes automedon*, Cram.	„

Subfam., Acræinæ.

57.	*Acræa anteas*, Doubl. & Hew.	Pueblo Viejo, Manaure, Atanquez.
58.	„ *acipha*, Hew.	San Antonio.

Subfam., Heliconinæ.

59.	*Heliconius metalilis*, Butl.	Manaure, Atanquez.
60.	„ *melpomene*, Linn.	Pueblo Viejo.
61.	„ *erato*, Linn.	Manaure.
62.	„ *clysonymus* Latr.	Between San Sabastian and Atanquez.
63.	„ *charitonia*, Linn.	Manaure.
64.	„ *eleuchia*, Hew.	Between San Sebastian and Atanquez.
65.	„ *aranea*, Fabr.	Manaure.
66.	*Eueides aliphera*, Godt.	„
67.	„ *cleobœa*, Hübn.	„
*68.	„ *edias*, Hew.	Valle Dupar.

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Subfam., NYMPHALINÆ.

69.	*Colœnis julia*, Fabr.	Manaure.
70.	*Agraulis juno*, Cram.	„
71.	„ *glycera*, Feld.	Between San Sebastian and Atanquez.
72.	„ *moneta*, Hübn.	Manaure.
73.	„ *vanillæ*, Linn.	Pueblo Viejo.
74.	*Euptoieta hegesia*, Cram.	Manaure.
75.	*Microtia elva*, Bates	„
76.	*Phyciodes claudina*, Eschsch.	Chinchicua, Manaure.
77.	„ *drusilla*, Feld.	Manaure.
*78.	„ *catenarius*, n. sp.	Chinchicua Valley.
*79.	„ *castianira*, n. sp.	Manaure.
*80.	† „ sp. ?	Manaure, Valle Dupar.
81.	„ *perlula*, Feld.	Between San Sabastian and Atanquez.
82.	„ *leucodesma*, Feld.	Manaure.
83.	*Eresia eranites*, Hew.	„
84.	„ *drypetis*, S. & G.	„
85.	„ *myia*, Hew.	„
86.	*Synchloe narra*, Fabr.	„
87.	„ *pœcile*, Feld.	„
88.	„ *saundersi*, Doubl. & Hew. ..	„
89.	„ *hippodrome*, Hübn.	„
90.	*Eurema lethe*, Fabr.	„
91.	„ *dione*, Latr.	San Antonio.
92.	*Pyrameis myrinna*, Doubl. & Hew. ..	Manaure.
93.	*Junonia lavinia*, Cram...	Pueblo Viejo.
94.	*Anartia jatrophæ*, Linn.	Manaure.
95.	„ *amalthea*, Linn...	„
96.	*Eunica caresa*, Hew.	„
97.	„ *alemena*, Doubl. & Hew... ..	„
98.	„ *malvina*, Bates...	„
99.	„ *mygdonia*, Godt.	„
100.	„ *cærulea*, S. & G.	„
101.	„ *modesta*, Bates	„
102.	*Hæmatera thysbe*, Doubl. & Hew. ..	„
103.	*Nica canthara*, Doubl. & Hew.	„
104.	*Temenis ariadne*, Cram.	„
105.	*Epicalia salacia*, Hew...	„
106.	„ *esite*, Feld.	„
107.	*Eubagis theseus*, Feld.	„
108.	„ *postverta*, Cram.	„
109.	„ *arene*, Hübn.	„
110.	„ *salpensa*, Feld.	„
111.	*Cybdelis mnasylus*, Doubl. & Hew. ..	Between San Sebastian and Atanquez.
112.	*Callicore marchalii*, Guer.	Manaure.
113.	„ *gabaza*, Hew.	„
*114.	*Perisama humbolti ?* Guer.	„
*115.	„ *gisco*, n. sp.	„
116.	*Catagramma aretas*, Hew.	„
117.	„ *pitheas*, Latr.	„
118.	*Gynæcia dirce*, Linn.	„
119.	*Ectima livia*, Fabr.	„
120.	*Ageronia feronia*, Linn.	Atanquez.
121.	„ *ferentina*, Godt.	Manaure, Pueblo Viejo.
122.	„ *arethusa*, Cram.	Manaure.
123.	„ *amphione*, Linn.	„

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124.	*Didonis biblis*, Fabr.	Manaure.
125.	*Cystineura bogotana*, Feld.	„
126.	*Pyrrhogyra edocla*, Doubl. & Hew. ..	„
127.	„ *typhæus*, Feld...	„
128.	*Timetes pelius*, Sulz.	„
129.	„ *chiron*, Fabr.	Pueblo Viejo.
130.	„ *berania*, Hew.	Manaure.
131.	„ *corinna*, Latr.	Chinchicua.
132.	„ *coresia*, Godt.	Manaure.
133.	*Victorina steneles*, Linn.	„
134.	*Amphirene epaphus*, Latr.	„
135.	*Adelpha lara*, Hew.	„
136.	„ *cytherea*, Linn.	San Antonio.
137.	„ *cocala*, Cram.	Manaure.
138.	„ *iphicla*, Linn...	„
139.	„ *alala*, Hew.	„
140.	„ *sychæus*, Butl...	„
141.	„ *celerio*, Bates...	„
142.	*Apatura laura*, Drury.	„
143.	„ *cherubina*, Feld.	„
144.	„ *pavonii*, Latr...	„
145.	„ *elis*, Feld.	„
146.	*Aganisthos orion*, Fabr.	„
147.	„ *pherecydes*, Cram.	„
148.	*Prepona gnorima*, Bates.	„
149.	„ *demophoon*, Linn.	„
150.	*Agrias ædon*, Hew...	„
151.	*Smyrna blomfildia*, Fabr.	„
152.	*Anæa glycerium*, Doubl. & Hew... ..	„
153.	„ *phidile*, Hübn.	„
154.	„ *cheronea*, Feld.	Chinchicua Valley.
155.	„ *pasibula*, Doubl. & Hew.	„
156.		
157.	„ *iphis*, Latr.	Manaure.
158.	„ *stheno*..	„
159.	„ *pithyusa*, Feld.	„
160.	*Siderone isidora*, Cram.	„
161.	„ *thebais*, Feld.	„
162.	*Hypna clytemnestra*, Cram.	„
163.	„ *rufescens*, Butl.	„
164.	*Protogonius cecrops*, Doubl. & Hew. ..	„

Fam., Lemoniidæ.

Subfam., Libithœinæ.

165.	*Libythea carinenta*, Cram.	Manaure.

Subfam., Nemeobiinæ.

166.	*Mesonemia telegone*, Boisd.	Valle Dupar.

Subfam., Lemoniinæ.

167.	*Esthemopsis clonia*, Feld.	Manaure, Atanquez.
*168.	„ *linearis*, sp. n.	„
169.	*Lymnas melantho*, Men.	Manaure.
170.	*Diorhina periander*, Cram.	„
171.	„ *butes*, Linn.	„

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172.	*Erycina atahualpa*, Saund...	Manaure.
*173.	*Siseme pomona*, n. sp.	Chinchicua.
174.	*Emesis cypria*, Feld.	Manaure.
175.	„ ?	Chinchicua.
176.	„ *æthalia*, Bates	„
177.	„ *mandana*, Cram..	Manaure.
178.	*Symmachia amazonica*, Bates	„
179.	*Charis cæneus*, Linn.	„
180.	„ *argyrea*, Bates	„
181.	„ *iris*, Stand	„
182.	„ *ocellata*, Hew.	Atanquez.
183.	*Lasaia meris*, Cram.	Manaure.
184.	*Lemonias pseudocrispus*, Westw... ..	Valle Dupar, Atanquez.
185.	*Apodemia campestris*, Bates..	Valle Dupar, Manaure.
186.	*Nymphidium eutrapela*, Bates	Manaure, Atanquez.
187.	„ *molpe*, Hübn.	Atanquez.
188.	„ *cachrys*, Fabr.	Manaure.
189.	„ *gela*, Hew.	„

Fam., Lycænidæ.

190.	*Thecla imperialis*, Cram.	Manaure.
191.	„ *togarna*, Cram.	„
192.	„ *volana*, Hew.	„
193.	„ *bæon*, Cram.	„
194.	„ *crolus*, Cram.	San Sebastian to Atanquez.
195.	„ *amyntor*, Cram.	Manaure.
196.	„ *talea*, Hew...	„
197.	„ *argiva*, Hew.	„
198—203.	*Thecla*, six species undetermined.	
204.	*Lycæna cassius*	„

Fam., Papilionidæ.

Subfam., Pierinæ.

205.	*Euterpe charops*, Boisd.	San Sebastian.
206.	„ *leucodrosime*, Koll.	Chinchicua.
207.	„ *critias*, Feld.	Atanquez.
208.	„ *teutila*, Doubl...	Manaure, San Sebastian to Atanquez.
*209.	„ *lycurgus*, n. sp.	San Sebastian to Atanquez.
210.	*Leptalis medora*, Doubl.	Chinchicua.
211.	„ *critomedia*, Hübn.	San Jose.
212.	„ *theucharila*, Doubl.	Manaure.
213.	„ sp. ?	San Sebastian to Atanquez.
214.	*Nathalis iole*, Boisd.	„
215.	*Terias vitellina*, Feld.	Manaure.
216.	„ *proterpia*, Fabr...	Pueblo Viejo.
217.	„ *bogotana*, Feld.	Manaure.
218.	„ *chloe*, Feld.	„
219.	„ *albula*, Cram.	„
220.	*Pieris pandosia*, Hew.	„
221.	„ *malenka*, Hew.	„
222.	„ *monuste*, Linn.	„
223.	„ *locusta*, Feld.	„

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224.	*Pieris peruviana*, Luc.	Manaure.
225.	„ *margarita*, Hübn.	„
226.	*Callidryas rurina*, Feld.	„
227.	„ *philea*, Linn.	Pueblo Viejo.
228.	„ *statira*, Cram.	Manaure.
229.	*Gonepteryx chlorinde*, Godt.	„

Subfam., Papilioninæ.

230.	*Papilio sesostris*, Cram.	Pueblo Viejo.
231.	„ *osyris*, Feld.	Manaure.
232.	„ *serapis*, Boisd.	Atanquez.
233.	„ *anaxilaus*, Feld.	Manaure.
*234.	„ *xanticles*, Bates	„
235.	„ *protesilaus*, Linn.	„
236.	„ *sadalus*, Luc.	Chinchicua Valley.
237.	„ *theophron*, Feld.	Manaure.
238.	„ *androgeus*, Cram.	„
239.	„ *theramenes*, Feld.	„
*240.	„ *ilus*, Fabr.	„
241.	„ *phaon*, Boisd.	„
242.	„ *lycidas*, Cram...	„
243.	„ *latinus*, Feld.	„
244.	„ *polydamus*, Linn.	„
245.	„ *thoas*, Linn.	„

Fam., Hesperidæ.

246.	*Thymele dorantes*, Stoll.	Pueblo Viejo, Manaure.
247.	„ *chalco*, Hübn...	Manaure.
248.	„ *proteus*, Linn...	„
249.	„ *neis*, Hübn.	„
250.	*Telegonius exadeus*, Cram.	Atanquez, Manaure.
251.	„ *etias*, Hew.	Manaure.
252.	„ *fulgerator*, Walch..	„
253.	„ *narcosius*, Stoll.	„
254.	„ *idas*, Cram.	San Sebastian.
255.	„ *iolus*, Cram.	Manaure.
256.	„ *anaphus*, Cram.	„
257.	*Æthilla coracina*, Butl.	Chinchicua.
258.	*Pyrrhopyga charybdis*, Doubl. & Hew.	Manaure.
259.	„ *phidias*, Linn.	Atanquez.
260.	„ *acastus*, Cram.	Manaure.
261.	„ *azeta*, Hew.	„
*262.	„ *ærata*, G. & S.	Pueblo Viejo.
263.	*Erycides palæmon*, Cram.	„
264.	„ *pygmalion*, Cram.	„
265.	*Carystus lutetia*, Hew.	Atanquez.
266.	„ *coryna*, Hew.	Manaure.
267.	„ *ethlius*, Cram.	Pueblo Viejo.
268.	„ *minos*, Latr.	Manaure.
269.	*Pamphila ares*, Feld.	„
270.	„ sp. ?	„
271.	„ sp. ?	Chinchicua.
272.	„ sp. ?	Manaure.
273.	„ sp. ?	San Sebastian.
274.	„ sp. ?	„
275.	*Achlyodes busirus*, Cram.	Manaure.
276.	„ *thraso*, Hübn.	„

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277. *Achlyodes thrasybulus*, Fabr. .. .. Manaure.
278. „ *melander*, Cram... .. .. Atanquez.
279. „ *asychis*, Cram. .. .. .. Pueblo Viejo.
280. „ ? *pyralina*, Hew... .. .. Manaure, San Sebastian.
281. „ sp. ? .. .. Manaure.
282. *Pythonides limæa*, Hew. .. .. .. „
283. „ *lerina*, Hew. .. .. .. „
284. „ *stigma*, Feld. .. .. .. „
285. *Pyrgus lorquini*, Hew... .. .. .. „
286. *Antigonus erosus*, Hübn. .. .. .. „
287. *Belias satyrus*, Feld. .. .. „
288. „ *salyrinus*, Feld... .. .. .. Manaure, San Sebastian.
289. *Helias noctua*, Feld. .. .. „
290. „ *albiplaga*, Feld. .. .. Manaure.
291—294. Species undetermined.

4. *Melincæa lilis*, Doubl. & Hew.

We prefer at present to refer the single example of this insect which Mr. Simons has sent us from Manaure to this species. It differs, however, in the following particulars from our Venezuelan and Panama specimens. There is a greater extension of the tawny colour towards the outer margin of the primaries at the expense of the black. The primaries have three subapical white spots, the second and third of which are bipartite, two double white submarginal spots between the first and second and the second and third median branches, and a row of the same colour on the black margin of the secondaries. These spots are absent or obsolete in *M. lilis*. It is probable that these differences are constant, and that the insect is a good local race; but in the absence of more materials we have thought it better to regard it as a variety only. It appears to bear about the same relationship to *M. lilis* that that form does to *M. imitata*.

9. *Ceratinia philidas*, sp. n. (Plate III., fig. 1).

Exp. 2·5 poll.

Alis rufis, anticis costa ad basin, margine interno et apicibus nigris, macula subtriangulari in cellulæ medio et duabus ad finem coloris ejusdem, litura flava ultra cellulam a costa angulum analem versus extendente, punctis septem margini externo parallelis, flavis; posticis fascia lata intra ramum medianum et marginem externum, hoc punctulis albescentibus obsoletis notato. Subtus ut supra, sed punctis marginalibus magis distinctis; antennis flavis, ad basin nigris.

Obs.—*C. thecæ*, Hew., affinis, sed anticarum macula cellulari nigra et secundariis fere omnino nigris distinguenda.

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18. "*Ithomia*" *cymothoe.*
25. "*Ithomia*" *guilia.*

The position of these two species in the *Ithomiinæ* is doubtful, but had best be left until the whole group is revised. They do not belong to any of the genera which we have lately examined in compiling the Rhopalocera in the "Biologia Centrali-Americana."

32. *Euptychia oreba*, Butl.

These specimens differ slightly from the types in being darker beneath—in having the outer of the two transverse bands of the secondaries more curved. There is a fulvous spot at the end of the cell in both wings not shown in the typical *E. oreba*.

35. *Euptychia peribœa*, n. sp. (Plate III., fig. 2).

Exp. 2 poll.

Alis cæruleo-griseis, anticaum costa et apice fuscis, posticis linea duplici fusca marginatis. Subtus alis fuscis, margines versus pallidioribus, lineis duabus arcuatis obscuris alas transeuntibus—una ultra cellulam, altera basi propiore; anticis quatuor ocellis minutis ad apicem, posticis quinque (tertio et quarto indistinctis) submarginalibus nigris albo pupillatis.

This *Euptychia* is not very closely allied to any with which we are acquainted; it seems, however, best placed in the *E. cœlestis* group. The blue-grey instead of blue on the upper surface distinguishes it at once from all others; the underside is also of a nearly uniform dark brown, slightly paler towards the outer margins of the primaries.

38. *Euptychia lineata*, n. sp. (Plate III., fig. 3).

Exp. 2·8 poll.

Alis fuscis, posticis ad angulum analem multo elongatis, et leviter serratis. Subtus alis saturatioribus limbisque externis pallidioribus, alis utrisque linea submarginali undulata, et altera interiore per cellulam transeunte, lineaque ochraceo-alba inter eas notatis (hac aliquando interrupta et fere absente); anticis et posticis ocellulis duobus apicalibus, albo pupillatis, tertio quoque majore in posticis ad angulum analem; antennis flavis, apicibus nigris.

This is a well-marked species, coming near *E. satyrina*, Bates, and its allies, but is larger than that species, and

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is distinguished by the white line which in most specimens crosses the underside of both wings. In some examples this line is obsolete, only indications of it being visible.

Lymanopoda cæruleata, n. sp. (Plate III., fig. 4).

Exp. 1·8 poll.

L. samio similis, sed alis latioribus et apicibus minus acutis, marginibus nigris, punctis albis (nec cæruleis) notatis; subtus alis anticis ad basin fuscis, area mediana nigris cæruleo atomatis et punctulis albis notatis.

This beautiful species seems to take the place of *L. samius*, in the Sierra Nevada of Santa Marta. It is distinguished by many characters, which will be apparent when *L. samius* is compared with the figure now given.

42. *Pedaliodes polyxo* (Plate III., fig. 8 ♂, 8a ♀).

♂ Exp. 1·6 poll.

Alis-fusco supra nigris; subtus anticis fuscis apice canescente, posticis ad basin obscurioribus, striga albescente transversa a limbo costali per cellulam ad marginem internum transeunte, ultra eam, presertim marginem internum versus, eodem colore variegatis, angulum analem versus obscurioribus et macula fere W formante apud cellulæ finem; margine externo et angulo anali productis et serratis ut in genere *Steromate*.

♀. Major et alis dilutioribus, posticis rufo variegatis et duabus lineis angularibus prope marginem externum notatis.

This species has the general appearance of a *Steroma*, but it wants the lobe on the costa of the hind wings which characterises that genus.

43. *Pedaliodes leucocheilus*, n. sp. (Plate III., fig. 5).

Exp. 2·5 poll.

Alis fusco-nigris, anticis ad apicem albescentibus: subtus anticis fuscis, apicibus canescentibus, macula indistincta cellulæ finem versus, altera subtrigona inter eam et limbum externum, rufis; posticis fusco irroratis, macula subquadrata in costa punctoque angulum analem versus albis notatis.

This is one of the peculiar species of the Sierra Nevada, of which Mr. Simons has sent several specimens. It has no very near allies that we know of.

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46. *Pedaliodes symmachus* (Plate III., fig. 7).

Exp. 2·4 poll.

Alis fusco-nigris, fascia submarginali ochraceo-feruginea a costa anticarum ad angulum analem posticarum transeunte : subtus alis fuscis rufo variegatis, anticis fascia submarginali introrsum irregulari ochraceo-ferruginea, costam versus cervino irroratis ; posticarum dimidio postico cervino et fusco irrorato.

Several specimens.

47. *Pedaliodes tyrrheus*, n. sp. (Plate IV., fig. 6).

Exp. 2·4 poll.

Alis fusco-nigris, posticis striga rufa submarginali a limbo interno medium marginis externi versus extendente ; subtus alis dilutioribus, et posticis striga ochracea nec rufa notatis.

A single specimen. The species resembles on the under side *P. paneis* (Hew.).

51. *Morpho rhodopteron*, n. sp. (Plate IV., fig. 9).

Exp. 4 poll.

♂. Alis cyaneis rosaceo tinctis, vix pellucidis, posticis ad angulum analem elongatis et irregulariter fusco tinctis : subtus pallidissime ferrugineis, striga submarginali ejusdem coloris, extrorsum et introrsum linea argentea notatis, aliis intra et ultra cellulam anticarum, regioneque basali posticarum lineis variis tortuosis notatis ; anticis ocello subapicali, posticis aliis tribus (uno ad apicem, aliis angulum analem versus positis).

Nearly allied to *M. aurora*, Westw., but easily distinguished by its more rosy tint on the upper side, and the absence of the two ocelli between the median nervules of the primaries on the under side. A single specimen only was procured by Mr. Simons at Pueblo Viejo.

68. *Eurides edias*, Hew. Journ. Ent. I., p. 155, t. X., f. 2.

,, *künowii*, Dew., Mith. d. Munich. Ent. Ver. 1877, p. 89, t. II., f. 5.

The specimen from the Sierra Nevada belongs undoubtedly to the insect described by Dr. Dewitz, but we cannot distinguish it from Bogota specimens, to which Hewitson's name is applicable.

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78. *Phyciodes catenarius*, sp. n. (Plate IV., fig. 11).

Exp. 1·4 poll.

♂. Alis obscure fuscis, linea angusta submarginali flava, intra eam serie coloris ejusdem catenam formante : subtus alis flavis, anticis lineis brunneis irregularibus transversis ; posticis punctis quinque nigris irroratis fasciaque ultra ea pallida margini parallela notatis.

Of this species Mr. Simons sends a single specimen, for which we are unable to find a name. Nor do we possess any very nearly allied species. In some respects it resembles *P. aceta* (Hew.).

79. *Phyciodes castianira*, n. sp. (Plate IV., fig. 10).

Exp. 1·3 poll.

Alis obscure fuscis, anticis maculis ferrugineis notatis (una in cellula, altera infra eam, tertia bipartita in area mediana, quarta trifida ultra cellulam a costa extendente), aliis duabus pallidioribus (una ad angulum analem, altera apici propiore), et tribus submarginalibus minutissimis ; posticis lineis tribus margini parallelis, duabus exterioribus augustissimis, interiore presertim costam versus latiore et secundam attingente, aliis indistinctis basi propioribus : subtus alis anticis fulvis, in dimidio exteriore nigro et fusco marmoratis ; posticis pallidioribus et minus irroratis.

This species is closely allied to *P. nebulosa*, G. & S.; but the markings, though somewhat similarly situated, are much brighter and larger ; the outer margin of the wing is less cut out ; it likewise differs considerably beneath, the secondaries of *P. nebulosa* being strongly marked with a silvery grey, which colour is absent in the species we now describe.

80. *Phyciodes*, sp. ?

Closely allied to *P. gyges*, Hew., from Jamaica, of which we have specimens from Venezuela.

114. *Perisama humbolti* ?

The specimen sent is not in sufficiently good condition to make it out satisfactorily.

115. *Perisama gisco*, n. sp. (Plate IV., fig. 12).

Exp. 1·8 poll.

♂. *P. euriclea* similis, sed alis anticis fasciis transversis

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viridibus augustissimis et angulum analem versus in maculas fractis differt; posticis supra quoque fascia submarginali augustiore, et subtus marginem interiorem versus pallidioribus.

The single male specimen sent differs in several points from *P. euriclea* of Venezuela, though nearly allied to that species.

168. *Esthemopsis linearis*, n. sp. (Plate IV., fig. 13).

Exp. 1·8 poll.

♀. Alis nigris cæruleo tinctis; anticis fascia arcuata albescente a basi per cellulam angulum analem versus extendente, secunda transversa subapicali, margine interno ceruleo; posticis area interiore albescente; venis omnibus late nigrescentibus; subtus fere ut supra; palpis et fronte rubro-aurantiacis.

E. sericinæ, Bates, certe affinis, sed maculis alarum albescentibus multo majoribus distinguenda.

173. *Siseme pomona*, sp. n. (Plate IV., fig. 14).

Exp. 1·4 poll.

♂. *S. caudali* similis sed alis dilutioribus et fascia transversa alba absente distinguenda; subtus pallidioribus et fascia angustiore.

Of this species we have specimens from Venezuela, obtained by Dr. Staudinger's collector in the vicinity of Merida.

209. *Euterpe lycurgus*, sp. n. (Plate IV., fig. 15).

Exp. 1·9 poll.

♂. Alis flavis, corpore, nervulis, marginibusque nigris, macularum serie submarginali (in posticis majorium) flaviarum, totidemque punctis in margine ipso flavescentibus; subtus fere ut supra, sed coloribus dilutioribus.

A single specimen only of this distinct *Euterpe* has yet reached us, which was captured by Mr. Simons on the road from San Sebastian to Atanquez. It appears to belong to the *E. nimbice* group; but the black markings are very narrow, and the yellow colour is very much brighter than in any species known to us.

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XI. *On the* Genus Colias.

By H. J. Elwes, F.Z.S., F.L.S.

[Read August 4th, 1880.]

Having recently had occasion to arrange the species of the Genus Colias contained in Messrs. Godman and Salvini's magnificent collection, and having found, as others have done before me, that the genus is an exceedingly difficult one, I offer a few notes on some of the species, in the hope that they may be useful to those who are not disposed to recognise every slight variety as a distinct species.

It is a very compact and homogeneous genus, containing, according to the views of some lepidopterists, a large number of species; but I venture to think that time will prove that many of these are but local varieties, and cannot possibly be distinguished from each other with certainty. The best proof of this is that if a large number of Colias from all parts of the world are mixed together, it is, in many cases, impossible to arrange them again under their supposed species. Some may be distinguished in the male sex only, others in the female. Many can only be referred to their right places when the locality from which they come is known, and as most of the local forms are variable, there will always remain, even when the habitat is known, specimens which cannot be named with certainty.

This applies specially to the North American forms, of which many have been recently described by Mr. Edwards and others; and as few or no specimens of some of these are to be found in European cabinets—or if they exist cannot be recognised—I can only follow Mr. Herman Strecker, whose catalogue of North American butterflies, recently published, seems to be drawn up with broader and more scientific views as to the value of slight variations than Mr. Edwards' catalogue, which appeared a year sooner.

Russian and German naturalists also have described many supposed species, which further investigations have proved to be identical with, or very slightly varying from, those now accepted; and I am convinced that a future

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generation of naturalists will prove that what we even now accept as specific differences are not founded on fact, and that climate, food, and conditions of life will more than account for the changes in tint we see of the representative forms such as *C. Aurora*, Esp., from Eastern Siberia; *C. Thisoa*, from N. Persia; and *C. Hecla*, from Lapland; whilst insects of different broods in the same region have, no doubt, as in other cases, been mistaken for different species.

Menetries, in the *Enumeratio Corporum Animalium*, p. 77, attempts to show that the nearly allied species of Colias may be recognised by the shape of the inner edge of the band on the forewing in the males (he gives on plate 1 cuts of the typical shape of this in one species); but after comparing his figures with specimens, and examining this character in a number of examples of one species, I am quite unable to follow out his theory.

Menetries says that he thinks too much importance has been attached to the shades of orange in different species, and to the violet reflections on them; but this is, after all, the only means by which several of the nearly-allied forms, such as *electra*, or *aurorina*, can be recognised in the male sex, and though varying in intensity, as we see in *C. Edusa* and *C. Hecla*, it is in fresh specimens from the same locality usually constant.

In most, if not in all, of the first group we find a pale form of the female, analogous to the variety of *edusa* named *helice*, but I am not aware of any similar aberration in the male sex.

Hybrids seem to occur between some of the species, and add considerably to the difficulty of recognising them. Cf. Möschler *Wien. Ent. Monats.*, iv. p. 22, and Edwards' *Butt. North America*, ser. 2. pt. v., where a hybrid between *Philodice* and *Pelidne* is suggested. Herr Werneberg, in *Stettiner Ent. Zeit*, 1865, p. 272, gives a revision of the European species of the genus, which he treats in a very different spirit from the majority of those who have studied it, and reduces those included in Staudinger's list to the following species: Group 1st, having the border of the forewing spotted in both sexes.

Hyale, L.
var. *Phicomone*, Esp.
var. *Nastes*, Boisd.
var. *Rossi*, Guenée.
var. *Melinos*, Eversm.

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Group 2nd, having the border of the forewing spotted in the female sex only.

Edusa, Fabr.
ab. *Helice*, ♀
var. *Helene*, Bisch.
var. *Heldreichi*, Std.
var. *Feildii*, Men.
var. *Aurorina*, H. S.

Myrmidone, Esp.
var. *Eos*, H. S.
var. *Libanotica*, Led.
ab. *Thisoa*, Men.
var. *Aurora*, Esp.

Erate, Esp.
ab. *Pallida*, Std.

Chrysotheme, Esp.
var. *Hecla*, Lef.
var. *Boothii*, Curt.
var. *Chione*, Curt.

Group 3rd, having the border of the forewing unspotted in both sexes.

Palæno.
var. *Philomene*, H.
var. *Europomene*, Ochs.
var. *Pelidne*, Boisd.
var. *Werdandi*, Zett.

He relies on the colour and form of the border, and on the discoidal spots of the hind wing for the characters by which the species are separated; but I cannot follow out his arrangement of the species in the specimens before me, and by no means agree with his conclusions; which are quite regardless of the distribution of the supposed species and varieties. His division into groups, however, seems quite natural, and is nearly identical with what I have adopted. Dr. Staudinger's arrangement of the genus in the last edition of his catalogue, 1871, is by far the best and most accurate I know of, though based on a narrower idea of specific distinctions than I can quite agree with. As, however, uncommon care has been taken in consulting all plates and descriptions, and the collection on which his

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catalogue is based, is at any rate for the Palæarctic species unrivalled, we cannot do better than accept his arrangement as far as it goes. After carefully studying the very fine collection of Messrs. Godman and Salvin, which contains good series of almost all the species, together with that in the British Museum, which is rich in specimens from the arctic regions; as well as the fine though not numerous examples in the Hewitson collection, I have arranged them in the following order, which I think will be found by an unprejudiced examiner to indicate pretty fairly the principal points of distinction, and to show the geographical distribution accurately.

GROUP I.—FEMALE SEX ONLY SPOTTED ON THE DARK BORDER OF THE FOREWING.

	Name of Species and Vars.	Geographical Distribution.
	C. Edusa, Linn.	Central and Southern Europe, N. Africa, and Syria.
Sub-species or local races in which the males are usually brighter or darker orange than in *edusa*, this character increasing in intensity as we go eastward.	*C. Myrmidone*, Esp.	Central, Eastern, and Southern Germany, S. Russia, and Turkey.
	C. Thisoa, Men.	Mountains of N. Persia.
	C. Feildii, Men.	Bhotan to Kashmir and Yarkand.
	(?) = *eogene*, Feld.	
	C. aurorina, H.S.	Mountains of Armenia.
	var. *Libanotica*	Mountains of Syria, North Persia and Asia Minor.
	var. *Heldreichi*	Mountains of Greece.
	C. aurora, Esp.	S.-E. Siberia and Amur region.
S. African sub-species, very near *Edusa*.	*C. electra*, L.	Cape of Good Hope, Natal, Transvaal.
Dwarf arctic sub-species or races.	*C. Boothii*, Curt.	Boothia-felix.
	var. *meadii*, W. H. Edw.	Mountains of Colorado, 10,000 feet elevation.
	C. hecla, Lef.	Greenland, Lapland.
	var. *glacialis*, Mac-Lachlan.	Smith Sound.
	C. chrystheme, Esp.	S.-E. Europe, Asia Minor, S.-E. Siberia.
	(?) = *Viluiensis*, Men.	
	var. *Eurytheme*, Bdl.	United States & Territories
	var. *Keewaydin*, W. H. Edw.	California.

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	Name of Species and Vars.	Geographical Distribution.
	C. philodice, Godt. . .	Eastern United States.
(Fide Strecker but seems to me more like a form of *palæno*)	var. *Occidentalis*, Scud. = *Chrysomelas*, H. Edw.	Pacific States and British Columbia.
	C. Erate, Esp. = *nereine*, Fisch. . .	S. Russia, Siberia, Amur, Afghanistan.
South American forms differing more from the *Palearctic* species of this group than they do *inter se*.	*C. Lesbia*, Fabr. = *pyrrothea*, Huba .	Argentine States to Patagonia.
	C. Vautieri, Guer. . .	Chili to Patagonia.
	C. Imperialis, Butl. .	Straits of Magellan.
	C. Dimera, Doubl. = *erythrogramma*, Koll.	Andes of Columbia and Ecuador.
	C. hermina, Butl. = *Scalidonura hermina*	Andes of E. Peru.
Species of doubtful position and distinctness, but probably coming here.	*C. euxanthe*, Feld. .	Peru.
	C. flaveola, Blanch. .	Chili.
	C. ponteni, Wall . .	Sandwich Islands.

GROUP II.—BOTH SEXES SPOTTED ON THE BORDER OF THE FOREWING.

	C. Sagartia, Ld. . .	North Persia.
	C. hyale, L.	Central and Southern Europe, Himalayas.
	var. *nilgheriensis* . .	Nilgherry Mountains.
	var. *simoda*, De l'Orza. = *poliographus*, Motschulsky	China, Japan.
	Phicomone, Esp. . .	Alps of Central Europe.
	var. *ladakensis*, Feld. . = *shipkee*, Moore . .	Ladak.
	(?) var. *melinos*, Eversm. .	S.-E. Siberia, Amur.
	Nastes, Bois. . . .	Labrador.
	var. *Werdandi*, Zett. .	Lapland.
	var. *Rossii*, Guen. . .	Boothia-felix.
	var. *Kokandica*, Ersch.	Alps of Turkestan.
(?) a distinct sp.	var. *Behrii*, W. H. Edw.	Mountains of California.

GROUP III.—BOTH SEXES UNSPOTTED ON THE BORDER OF THE FOREWING, OR THE FEMALE ONLY SLIGHTLY SPOTTED, OR THE BORDER REPLACED BY MORE OR LESS FAINT MARKINGS.

Fide Strecker	*Palæno*, L.	Northern Europe, Asia, and America, N. Japan, Alps of Central Europe.
	= *Helena*, W. H. Edw. .	
	= *Chippewa*, W. H. Edw. .	

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	Name of Species and Vars.	Geographical Distribution.
Fide Strecker	*Pelidne*, Boisd.	British N. America, Labrador, Colorado, Canada, Anticosti, Lake Superior, B. Columbia.
Do.	= *Scudderi*, Reak . . .	
Do.	var. *Interior*, Scudd. . .	
	var. *Christina*, W. H. Edw.	
(? a good sp.)	*Alexandra*, W. H. Edw.	
Fide Strecker	var. *Edwardsi*, Behr. .	Colorado, Nevada.

American forms unknown to Strecker or myself, and not existing in his or in any English collections, are *C. Emilia*, W. H. Edw.; *Barbara*, H. Edw.; *Astriea*, W. H. Edw.

N.B.—This group does not seem so natural as the other two, and perhaps connects them; for though in the female of some forms of *Palæno* and *pelidne* the border of the forewing is unspotted, in others it is so to a certain extent, or the border is entirely wanting, or indicated only by indistinct markings, as in *Alexandra*, *Scudderi*, and *Edwardsi*.

These N. American forms seem to run into each other in an inextricable manner, and to connect *Palæno* and *pelidne* with *Philodice*, *Cf.* Edwards' *Butt. North America*, ser. ii. part ii., under *C. pelidne;* and part v., under *Philodice*. *Cf.* Schilde, *Stett. Ent. Zeit.*, 1873, pp. 169—75.

Mr. Edwards, in his beautiful work, gives excellent figures of all these forms; but so far from clearing up the question of their distinction, he seems to me to make the question infinitely more difficult, as I am quite unable to appreciate the characters on which he relies, or to define the limits of the three species, even supposing that we allow only three, as above, instead of seven or eight as he does.

I do not think that all the species which are mentioned above can invariably be recognised with certainty, and I am certain that many of the varieties could not; yet, as for the most part they have a fairly well-defined range, they may be allowed specific rank for convenience' sake, and in the absence of full information as to their larval states. Speaking broadly, there are, with the exception of the Neotropical species, which are confined to the Andean ranges and temperate regions of the south, three well-defined species of *Colias*, representing the three groups which I have formed. These are nearly confined to the Palearctic and Nearctic regions, which, as far as butterflies are concerned, are inseparable. They are *C. edusa*, *C. hyale*, and *C. palæno*. The first and last of these vary exceedingly,

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and have developed a number of constant local varieties, whilst other varieties do not appear to be fixed, and all are much influenced by local conditions. *Palæno* and its forms are pretty nearly confined to the colder regions of Europe, Asia and America. *Edusa* takes its place in more southern and warmer regions, though it also has developed arctic forms, like *Hecla* and *Boothi*. *Hyale*, with its forms, is confined to the Old World, though its arctic and alpine representative nastes spreads into the northern parts of North America.

As regards the species in Group I., *C. edusa* seems to be smallest in Syria and largest and brightest in the South of Europe.

To *Myrmidone*, which does not extend to Northern or Western Europe, it is very closely allied. As we go east it develops other forms, such as *Thisoa*, *aurorina*, *Feildii*, and *aurora*, gradually increasing in brilliancy.

In South Africa it appears in the form of *electra*, which though distinguished in the male sex by the tint of the orange, in the female sex may easily be confused with the females of the Himalayan form *Feildii*. Near this latter there are specimens from Ladak, in the British Museum and in Mr. Moore's collection, differing considerably from the usual Himalayan form found in Kashmir, Nepal, and Sikkin; but I should not like to separate them specifically without knowing more about them.

Another supposed species, differing from *Feildii* in its paler colour, and having some slight difference in the discocellular marks, has recently been separated by Moore as *C. Stolikczkana*, from Ladak, and another from Turkestan has been described as *C. Staudingeri*. A female from the Punjaub is very near the Grecian *Heldreichi* (for the varieties of which consult Staudinger on the Lepidoptera of Greece and of Asia Minor, in Horæ Ent. Ross).

C. aurora, first figured and described by Esper, from specimens sent by Bober from Nertchinsk, and afterwards found at Kiachta on the border of the Gobi desert, and on the Amur river by later travellers, is the brightest in colour of any of the genus, and though, according to my views, only a local race of *Edusa*, is very easily distinguished from any of the other varieties, by the extremely bright fiery orange in the wings of fresh males, and as it appears from the figure of Boisduval, in the females also (though I have seen none of this colour). In Mus.

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Godman and Salvin are two females from the Amur of the pale form, figured by Eversmann, Bull. Mosc. 1847, t. 4, figs. 3 and 4, as *C. chloe*. This form is evidently the analogue of the var. *helice* in *C. edusa*.

Females appear to be rare, as there are none in the Hewitson or British Museum collections.

As regards *C. chrysotheme*, Esp., it seems to agree very closely with some of the varieties of *Eurytheme* from California and Texas, though, if we consider it as the same species, the geographical distribution is remarkable, *Chrysotheme* being confined to South-Eastern Europe, some parts of Asia Minor, and Eastern Siberia. I cannot distinguish between specimens of *Chrysotheme* from Pesth, and of *Keewaydon* from California.

Colias Boothii Curt., Ross, 2nd Voy. App. Nat. Hist. p. 65, Pl. A., 3-5, 1835; Guenée Ann. Ent. Soc. Tr. 1864, p. 198.

C. Chione Curt., l. c. p. 66.

This species or variety is only known from the specimens collected in Captain Ross's second expedition to the arctic regions, at Repulse Bay and in Boothia-felix, where it is said to be abundant for about a month in July and August on *Oxytropis campestris*, and *O. arctica*, which are probably the food plant of the larva.

They have been considered by all writers as a good species, on account of the very narrow border of the wings, which is entirely absent in the var. *Chione*.

I am doubtful, however, whether this last, of which three specimens from Repulse Bay are in the British Museum collection, are not rather a form of *C. Boothii*, or a hybrid between that and *Nastes*.

Colias Hecla, Lefebre Ann. Soc. Ent. Tr. 1836, p. 383, Pl. IX. B. fig. 3-6.

C. Hecla, var. *Glacialis*, McLach. J. L. S. Zool. 14, 108, 1879.

This species, which is found on the high fells of Lapland, in Greenland, and Arctic America, is, from my point of view, only a dwarfed local race of *C. Edusa*.

The variety of it described by McLachan from Hayes Sound, lat. 79° N., and from Grinnell Land in lat. 81° 45′ N., are probably the most northern specimens known of this germ, and are much paler in tint and duller in their markings than the Lapland variety.

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C. erate is a puzzling species, which, though distinct enough in Southern Russia, appears to have a tendency for crossing with other species, such as *Edusa* and *Hyale*.

From Candahar Mr. Butler has recently described no less than four supposed species and varieties (see P. Z. S. 1880) nearly allied to this; but, after examining the specimens in question, I can only say that I entirely fail to follow his distinctions. Those which he calls *Erate*, from Candahar, agree closely with examples from South Russia and the Punjaub.

What he calls *Helichta* of Lederer has in the male more of the orange tint of *Edusa*, and may, as was originally supposed, be a hybrid between it and *Erate*. What he calls *Sareptensis*, Staud., seems identical with the form of *Hyale*, found in the Himalayas, China, and Japan, under the names of *Simoda*, De l'Orza; *Poliographus*, Motsch.; Pauens, Butl., &c.

Of what he calls *Pallida*, Staud., the female seems like *Hyale*, or a pale female of *Erate*, and the male a small specimen of the latter species.

Colias Lesbia, Fabr. Ent. Syst. iii. i., 208, 652; Butl. Cat. Fabr. Pl. II., fig. 2, 1870; Burm. Desc. Phys. Rep. Arg. Vol. V., p. 95.

C. pyrrothea, Hubn. Exot. Schm. Zutr. ii., 28, 183, fig. 365, 366.

C. heliceoides, Capron. Ann. Soc. Ent. Belg. t. XVII. 13.

This species, first described by Fabr. from a ♀ specimen in the Banksian collection taken in the Straits of Magellan during his voyage with Cook in 1790, is common, according to Burmeister, all over the Argentine Republic, from the Straits as far north as San Paolo in S. Brazil (Rodgers in Mus. Godman and Salvin).

The females vary, but not enough, according to Burmeister, to allow them to be considered as sub-species, the males being very similar. One ♀ from Coralitos, Entre Rios, in Mus. Godm. and Salv., is as dark, and almost exactly similar to the ♀ of *Meadii*, while others are pale, like the var. *Helice* of *Edusa*.

The caterpillar lives on *Medicago sativa*, according to Burmeister. Two male specimens of this species in Mus. Godm. and Salv. are marked Chili (Reed), but as it is not included in his work, I conclude they are from Mendoza, or some locality on the east side of the Andes.

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Colias Vautieri, Guer. Voy. Coq. Pl. XV., fig. 2, 1829, ♀ ; Blanch. Gay Faun. Chil. vii. p. 18, 1852 ; Reed Mariposas, Chil. p. 15, 1877.

C. rutilans, Boisd. Sp. Gen. i. p. 642, Pl. XIX., fig. 3, 1836 ; Blanch. Gay Faun. Chil. vii. p. 18, t. I. f. 7 a b, 6, ♂ ; Reed Mariposas Chilenas, t. I. fig. 3, 4, ♂ ♀.

This species, in which the ♂ and ♀ differ remarkably from each other, the latter resembling the pale ♀ of *Lesbia* in markings and tint, whilst the ♂ have something of the brilliant tints of *C. electra*, is, according to Reed, common through the whole of Chili, from Atacama to the Straits of Magellan.

The figure of the ♀ given by Reed is coloured much more darkly than any I have seen, the yellow being almost covered by the black of the border.

Colias flaveola, Blanch. Gay, Chili, vii. p. 19., t. I. fig. 6 a b, Reed Mariposas Chilenas, p. 18.

The description of this species in Gay does not say anything as to the sexes, whilst the figure seems to represent a ♀. It is said by Gay to have been taken at Coquimbo, but Reed has never seen a specimen, and there is none in any collection I have seen, though a female from Bolivia collected by Buckley in Mus. Godm. and Salv. somewhat resembles it.

Very possibly this is not a good species, but only a small aberrant female of *dimera* or *Vautieri*.

Colias Imperialis, Butl. P. Z. S. 1871, p. 250, Pl. XIX. ; Reed Mariposas Chil. p. 16.

This fine and distinct species is easily distinguished by the broad black border on the wing in both sexes, which extends to the anterior margin of the hind wing.

It is only known to me from three specimens in the British Museum, collected at Portfamine, about the centre of the Straits of Magellan.

There are specimens of *C. Lesbia* from this locality in the British Museum, and others of what appears to be *Vautieri*, though it has a narrower border than Chilian specimens from Sandy Point, a little to the north-eastward. We therefore have three apparently distinct species of *Colias* meeting in the Straits of Magellan, so that a large

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series of specimens showing their variations and possible hybrids would be of great interest.

Colias dimera, Doubl. Hew. Gen. D. L. t. IX. fig. 3, 1847.

C. erythrogramma, Koll.

(?) *C. euxanthe*, Feld. Reise. Nov. Lep., II. p. 196 (1865).

This species, which may be easily recognised by the pale colour of the hind wings, which are of a very different colour from the fore wings, and by the blood-red spots and streaks on the under side, which are conspicuous in most specimens, is found in the equatorial Andes of New Granada, and perhaps Venezuela. Specimens from Bogota are common in museums.

The species described as *C. euxanthe*, by Felder, I cannot identify with certainty in the absence of a plate. It is described as being very near *C. dimera*, but differing in the shape of the wings, and larger. There are four specimens in the Hewitson collection, under the name of *euxanthe*, from Ecuador and Peru, which may belong to *C. hermina* or to *dimera*, or may be a distinct species. There are also two Chilian specimens in Mus. Godm. and Salv. which I cannot identify with any known species, so that a more complete account of the South American *Coliades* is much to be desired.

Colias (Scalidoneura) hermina, Butler, P. Z. S. 1871, p. 250, Pl. XIX., fig. 5.

This obscure species, on which Mr. Butler has founded the genus *Scalidoneura*, appears to be very rare in collections.

The type specimen which I have examined in the British Museum is from Peru, and is probably from the same locality as two specimens in Mus. Godm. and Salv., which were collected by Whiteley at Pozuzzo or Pozuzu, a branch of the Ucayale River, on the Upper Amazon, and situated in about lat. 10° N., long. 75° W.

It appears to be very closely allied to *C. dimera*, and can only be recognised with certainty by the slightly different branching of the costal nerve towards the apex, on which, as it seems to me, insufficient character Mr. Butler has founded the genus *Scalidoneura*.

In all other respects it appears to be a true *Colias*, only distinguishable from *dimera* by the narrower border of the

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fore wings, and by the colour of the hind wing not differing from that of the fore wing, as it does in *Dimera*.

There is a specimen in Mr. Hewitson's collection which may possibly be the ♀ of this species; but in the imperfect light of the building I was unable to detect the difference in the neuration.

Colias hyale seems confined to the Old World, no form of it having been discovered in the New, though it spreads over most of Asia, and has received numerous specific names.

In the British Museum collection Mr. Butler indicates no less than four forms of this species, all of which he considers distinct, from Japan—viz., *Simoda*, *Poliographus*, *Pallens*, and another. He professes to be able to distinguish them with certainty, but I entirely fail to follow him in doing so. Probably special training is necessary to enable one to appreciate such minutiæ; but in any case it would be most unlikely that in such a genus four species of one group should exist in Japan alone, or rather in that very small part of Japan from which collections have come.

Hyale extends to the Himalayas, to China, at any rate as far as Shanghai, into South India, under the name of *Nilgheriensis*, and is said by Layard to have occurred in South Africa, though I know of no authentic specimens from that country.

C. Sagartia Led., from the mountains bordering the south end of the Caspian Sea, seems a good species, nearly allied to *Phicomone*, and representing it in Asia, but easily distinguished by colour and size from that species.

Colias ladakensis, Feld., Reise. Nov. Lep. II. p. 197, Pl. 27, fig. 8, 9, 1865.

C. shipkee, Moore, P. Z. S., June 13, 1865, p. 492, t. XXXI. fig. 13.

There seems to be little doubt that these two supposed species are identical, though the figure of *Shipkee* is not good.

There are two specimens from Ladak in Hewitson's collection named *C. Vautieri* ! ! ! and two others in the British Museum from Tibet, apparently ♂ and ♀, which all agree very well with Felder's plate.

It seems to me a local race of *C. Nastes* or *Phicomone*, though easily distinguished by its bright lemon colour.

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As regards the correct name of the form, I adopt Felder's, because it is the most scientific, and because the part of the P. Z. S. in which *C. shipkee* was described, though read in June, would not have been published till the end, or near the end, of the year, and therefore probably be later than Felder's description, the date of publication of which seems not quite certain.

This is an essentially alpine form occurring at elevations of 14,000 feet and upwards in the dry region of Ladak.

C. melinos Eversm., from the Amur region, is perhaps another form of *Phicomone*, but is very imperfectly known as yet, and may be a distinct species.

The various forms of *Nastes* are puzzling, and if I am right in referring *Kokandica* Ersch and *Behrii* Edw., to this species, the distribution is still more so. I am somewhat doubtful about the last of these forms, which Mr. Strecker considers distinct. I fail to see any good character by which *Nastes* can be distinguished from *Phicomone*, of which it may be only an arctic form. The var. *Werdandi* from Lapland is just as likely to belong to one as the other, though *Phicomone* as found in the Alps of Central Europe does not seem to have so much tendency to variation as most of the species.

Colias Pelidne. Boisd. Ic., p. 41, Pl. VIII. figs. 1—3. (1832.)

I adopt Boisduval's name instead of the name *Anthyale* Hubn., which is given to it by Staudinger, because the latter expressly states in his account of that species that it comes from Pennsylvania, which in my opinion proves his *Anthyale* to be a small specimen of *Philodice*, God., *Cf.* Mosch. Stett. Ent. Zeit., 1870, p. 113.

This supposed species, which comes very close to *Palæno* on the one hand and to *Philodice* on the other, is found in Labrador, British Columbia and Colorado; but various forms of it which have been described as distinct species under the names of

Colias interior, Scud. Proc. Bost. Soc. Nat. Hist. ix. p. 108, from South Labrador and Anticosti,

C. Christina, W. H. Edw. Proc. Ent. Soc. Phil. II. p. 79, Brit. N. Am. I. t. II., from British Columbia,

C. Scudderi, Reak., Proc. Ent. Soc. Phil., iv. p. 217,

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C. Philodice, var. Laurentina Scud. Proc. Bost. Soc. Nat. Hist. p. 4, Oct. 1875, from Lake Superior,

are found in other parts of North America; and according to Mr. Strecker's catalogue and to what I can see from the figures and descriptions, they are at most but local varieties of one species. Indeed, I cannot see how the numerous forms of *Palæno, Pelidne* and *Philodice*, found in North America, can be assigned with certainty to one or other of these species; and the confusion of names which exists is so great, that without access to the principal collections in the United States, it seems to me impossible to unravel them.

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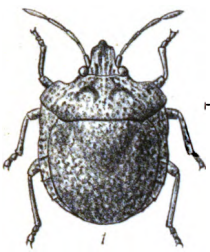
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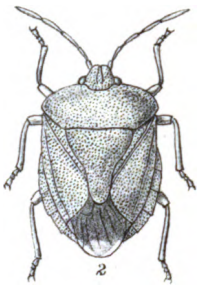
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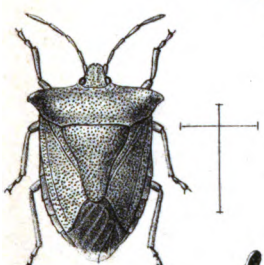
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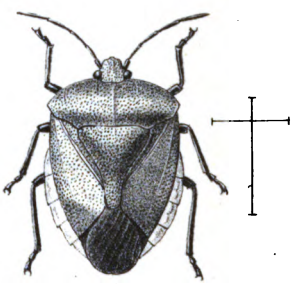
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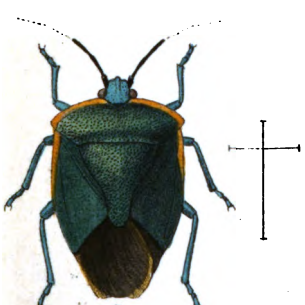
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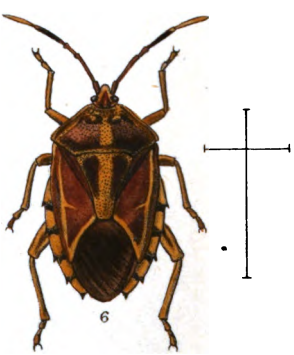
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W.Purkiss lith. Hanhart imp.

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XII.—*Notes on Exotic* Rhynchota, *with descriptions of new species.* By W. L. Distant.

(Plate V.)

[Read August 4th, 1880.]

Lobothyreus obscurus, n. sp. (Plate V., fig. 1, 1*a*).

Ferruginous, mottled with ochreous. Head above, with the central lobe margined with ochreous for about two-thirds from base, and a small basal oblique black fascia placed on inner margin of each ocellus; beneath with apical half black, basal portion ochreous. Antennæ with the first three joints about equal, third and fourth longest and sub-equal; three basal joints castaneous, first darkest, fourth castaneous with the basal half ochreous, fifth pitchy. Pronotum with the lateral margins deeply sinuated, the lateral angles very broadly prominent and somewhat truncate; marked irregularly with fasciæ formed of confluent black punctures, between which the ground colour is much paler and more finely and sparsely punctured; a pale, central longitudinal line extending half across disk from anterior margin. Scutellum with the base somewhat gibbous, on which is a paler ochreous patch mottled with confluent black punctures; on each side of this the surface is abruptly deflexed and excavated, and defined with a somewhat obscure arctuated black fascia. The whole surface is somewhat thickly and finely punctured, with the lateral margins and apical half granulate. Costal margins of corium marked with transverse black fasciæ. Sternum ochreous, punctured, and mottled with black; abdomen dark castaneous, thickly and finely punctured on lateral margins, more sparingly so on disk. Legs castaneous with ochreous markings, tarsi dull, ochreous. Rostrum castaneous, scarcely extending beyond posterior coxæ.

Long. 10 millims. Lat. pronot. angl. 7 millims.

Hab. Peru.

Differs from *L. lobatus*, at present the only other known species of the genus, by its much larger size, the

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profoundly sinuated lateral margins of the pronotum, the granulated scutellum, different coloration, &c.

Podisus œnescens, Stål. Rio. Jan. Hem. I. p. 11, 5 (1865).

Var. Apex of scutellum concolorous, not luteous, abdomen beneath with a central row of large greenish-black spots, on each side of which is a lateral row of smaller ones of the same colour.

I have not seen typical specimens of this species, but this form otherwise agrees so closely with Stål.'s description, that I have identified it as a variety of the same. The colour of the two basal joints of the antennæ are very dark testaceous.

Hab. Teffe, Ega; Amazons (*de Mathan*). Coll. Oberthur.

Oplomus marginalis. Hope.

Pentatoma marginalis. Hope. Cat. Hem. I. p. 37 (1837).

Var. Differs from type in having the scutellum marked with a central basal, somewhat triangular black spot, which occupies about half its length. Corium without black macular marking.

Hab. Obydos. Amazons (*de Mathan*). Coll. Oberthur.

Palomena amplificata, n. sp. (Plate V. fig. 2).

Above green, thickly punctured, head densely and finely punctated, the lateral margins slightly reflexed, lateral lobes longer than central, and cleft at apex; pronotum thickly punctate and somewhat rugulose, the lateral margins ampliated and rounded, lateral angles obtusely prominent; scutellum thickly punctured, somewhat rugulose. Corium with the punctures somewhat finer and more regular; membrane brassy, shining. Underside of body paler, disk of abdomen and coxæ pale luteous, legs green, tarsi brown. Connexivum well produced, green, thickly punctured. Antennæ green, fourth and fifth joints brown, the last joint with apical half pitchy; second joint longer than third; fourth and fifth sub-equal. Rostrum pale luteous, with a central dark line, and apex narrowly pitchy.

Long. 13 to 14 millims. Lat. pronot. angl. 8 to 9 millims. Max. exp. abd. 8 to 9 millims.

Hab. Shantung, N. China.

This species is easily distinguished by the ampliated pronotum, and the broad ovate body.

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Palomena spinosa, n. sp. (Plate V., fig. 3).

Above green, thickly, darkly, and coarsely punctured. Head coarsely and somewhat densely punctured, the lateral lobes longer than the central and cleft at apex, with the lateral margins slightly reflexed. Antennæ with the first three joints green, fourth excepting base and whole of fifth brown, second joint longer than the third, fourth and fifth sub-equal. Pronotum coarsely punctured, somewhat sparingly so on disk, with the lateral angles produced into broad, obtusely pointed spines, somewhat rounded and narrowly black at apex; scutellum thickly punctured, more sparingly so at apex; corium thickly punctured, especially near costa; membrane brassy, shining. Connexivum green, thickly and darkly punctured, narrowly luteous on outer margin, and at segmental incisures. Body beneath paler, disk of abdomen, coxæ, and bases of femora somewhat luteous; legs green, tarsi brown. Stigmata marked with black dots. Rostrum luteous, with the apex narrowly black

Long. 13 to 14 millims. Lat. pronot. angl. 9 to 10 millims.

Hab. N. India. Sind.

Allied to *P. angulosa*, Motsch., but separated at once from that and all other species of the genus by the much produced pronotal angles.

Caura excelsa, n. sp. (Plate V., fig. 4).

Dark shining blue or green, thickly and finely punctate. Head very densely and finely punctate, luteous beneath. Antennæ concolorous, second joint shorter than the third, fourth longest, third and fifth sub-equal. Pronotum and scutellum very thickly punctate, obscurely rugulose; lateral margins of pronotum somewhat ampliated, reflexed, and rounded. Corium opaque, very finely and sparingly punctured. Membrane pitchy opaque. Abdomen above and connexivum luteous. Body beneath luteous. Prosternum, mesosternum, and metasternum, with two transverse blue spots on each side; abdomen with a sub-marginal row of transverse bright blue spots, placed close together in pairs on the base and apex of each segment; within these a segmental row of three or four small spots and a central row of transverse streaks of the same colour, coxæ luteous, legs and rostrum dark blue.

Long. 15 millims. Lat. pronot. angl. 10 millims.

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Hab. Calabar, W. Africa.

Allied to *C. azurea Fabr.* and *C. bipartita Sign.* Differs in its larger size, and different colour of the head above. The head is also much shorter than *C. bipartita*, and the legs and head different colour to *C. azurea*.

Caura marginata, n. sp. (Plate V., fig. 5).

Above green, lateral borders of pronotum and basal border of corium luteous. Head green, very thickly punctured; pronotum and scutellum finely and densely punctured, somewhat rugulose; the colour of the head, pronotum, and scutellum is shiny, that of the corium opaque and very finely punctate. Membrane pitchy opaque, margins fuscous. Underside of the body luteous, with a sub-marginal row of blueish spots, one on prosternum, one on mesosternum, one on metasternum, and one on each abdominal segment. Legs green, shiny. Antennæ green, first joint narrowly luteous at base, second joint slightly longer than third (remainder mutilated). Rostrum luteous, clouded with fuscous.

Long. 15 millims. Lat. pronot. angl. 10 millims.

Hab. Calabar district, W. Africa.

Allied to preceding species, but less ovate, lateral borders of pronotum more strongly reflexed, colour also different.

Edessa inclyta, Walk. Cat. Het. pt. iii. p. 445, 118, (1868). Walker describes this species as having the "abdomen above black." In all the specimens in my collection, which have been carefully compared with the type, the dorsal colour is dull red. The general colour also varies from olive green to castaneous.

Hab. Bogota, Demerara. (Coll. Dist.) Amazons; Obydos, Ega. (Coll. Oberthur.)

Oncoscelis antennatus, n. sp. (Plate V., fig. 6).

Above purplish, with luteous markings; head luteous, central lobe margined with fuscous, and an obscure fuscous patch on front of each ocellus; ocelli red, eyes black, lateral borders strongly reflexed, antennæ red; fourth joint, excepting base and apex, black; second joint longest; third very short, not equal to first; fourth slightly longer than fifth. Pronotum purplish, with the frontal and lateral margins; a broad central longitudinal fascia, and a narrow obscure line at base luteous; within the lateral luteous

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border is a sub-marginal strongly indented black line; near frontal margin, on each side of central fascia is an irregular darker patch enclosing a small luteous space. Scutellum purplish, with the basal angles narrowly, and a central longitudinal fascia continued from that of pronotum, and apex broadly luteous. Corium purplish, with basal margin, radial suture for half its length from base, and apical margin luteous. Connexivum luteous, with base and apex of each segment black. Abdomen above reddish; membrane dark, brassy, shining; underside of body and legs luteous; apices of femora, tibiæ, and the tarsi purplish; stigmata black; abdomen centrally and longitudinally sulcated.

Long. 22 millims. Max. lat. 12 millims.

Hab. Torres Straits.

Allied to *O. sulciventris*, Stål., but differs from that species in having the abdomen sulcated in both sexes. The colour is also very different, and fourth joint of the antennæ black, and not concolorous, as in *O. sulciventris*.

Plisthenes dilatatus. Montr.

Tesseratoma dilatatum, Montr. Ann. Sciene. phys. Sér. 2, vii. i. p. 100 (1855).

Oncomerus dilatatus. Voll. Faun. ent. ind. Néerl. iii. p. 32, 4 (1868).

Stål. (En. Hem., i. p. 63) considered this species as a variety only of *P. merianæ*, Fab. Vollenhoven describes it as being generally smaller than that species. I have not been able to find agreement with either of these authors. A specimen of *P. dilatatus* which I possess, from near Fort Moresby, is considerably larger than specimens of *P. merianæ* ♂ and ♀, which I have received from the same locality and from Murray Island. These last agree with the Australian varieties described by Stål., having the last two joints of the antennæ luteous, the base of the third being black. The antennæ will, however, I think separate these forms.

Antennæ with the second joint shorter than the third.
  Abdomen beneath, with a central piceous longitudinal fascia . . . . . *P. merianæ.*
Antennæ with the second and third joints sub-equal.
  Abdomen beneath, with a central and two sub-marginal longitudinal fasciæ . . . . . *P. dilatatus.*

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Tiarodes Meldolæ, n. sp. Sanguineous; head above, apices of femora, bases of tibiæ, and abdomen blueish-black, shining. Hemielytra, excepting a broad sanguineous patch at base of costa, black opaque. Sternum with two lateral and two central streaks of blueish-black.

Long. 20 to 22 millims.

Hab. Port Blair, Andaman Isles. *(R. Meldola.)*

Allied to *T. versicolor*, Lap., from which it differs by the different colour of the tibiæ scutellum and underside of abdomen, its much greater size, and also by the relative depth of the anterior and posterior lobes of the pronotum, which are, in that respect, sub-equal.

Fulgora andamanensis, n. sp. (Plate V., fig. 7, 7*a*).

Rostrum long, slender, ascending, as long as body; beneath greenish-luteous, with the apex black, above black, apical two-thirds, irrorated with small white spots, and a luteous streak on each side within the eyes, which are also luteous; thorax above black, with dull luteous markings; abdomen above pale greenish-luteous, beneath black; coxæ trochanters and femora fuscous, the last darkest, tibiæ and tarsi black. Tegmina black, with the veins pale green, and a number of brown spots encircled with pale greenish, arranged in the following manner: a transverse row of four near base, the upper three fused together; two irregular transverse rows on disk, a little nearer together than from basal row, followed by a straighter transverse row of three smaller ones; remaining apical portion occupied by about twelve spots, of which the largest are two fused together on costa, and one with a very small brown centre about apex of inner margin; extreme apical spots very small and somewhat indistinct. Wings blue, with the apex broadly and outer margin somewhat narrowly black. The veins on the blue portions of wings are green, with the exception of two, which are narrowly black at base.

Long. rostr. 20 millims. Long. body 20 millims. Exp. tegm. 68 millims.

Hab. Andaman Isles.

Allied to *F. Delessertii*. Guer. and *F. maculata*, Oliv. It somewhat resembles the first in pattern of tegmina, but differs in length of rostrum, which in *F. Delessertii* is but about half the length of the body. In length and structure of rostrum which seems to be the structural character to differentiate the species of this genus, it is more closely allied to *F. maculata*; the rostrum, however, is longer

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than in that species, being about equal to the length of the body, and, besides the different pattern of the tegmina, the wings are much more narrowly black along the posterior margin.

Flata (Colobesthes) Pryeri, n. sp. Body above and tegmina pale greenish, wings pale greenish white. Tegmina with the costal, outer and inner margins (the last only half the length from apex) narrowly and obscurely luteous, and with an angular black line on disk, about half way from base and about two-thirds the distance from costal margin. Body beneath and legs somewhat luteous.

Long. body 10 millims. Exp. tegm. 36 millims.

Hab. Sandakan, N. Borneo. *(Pryer.)*

Face broad, convex, with a central raised line, the sides ampliated. Posterior angle of tegmina attenuated and acute, expanse at outer margin twice that of width near base. Two well developed, transverse, somewhat irregular series of veinlets preceding outer margin, and a third one situated mid-way between these and the reticulated area.

Allied to *C. marginata*, Walk.

A second specimen from Penang is in the collection of the Brit. Mus.

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XIII. *On the Asiatic Lepidoptera referred to the genus* Mycalesis; *with descriptions of new genera and species.* By F. Moore, F.Z.S., &c.

[Read October 6th, 1880.]

The Asiatic species of butterflies hitherto described under the genus *Mycalesis* are primarily divisible into three groups: the first comprising species of which the males possess a glandular-pouch (or scent-producing organ) covered by a tuft of hair on both the fore and hind wings; the second group of species possessing it on the hind wings only; and the third of species which have two on the hind wings.

These three groups, again, are composed of a number of forms mostly possessing a different vein structure. Thus separated they fall into a natural assemblage of species.

I have not ventured into an examination of the African species further than the determination of the form and structure of the type of the genus *Mycalesis* (viz. *M. Evadne*, Cramer); finding, however, that this form has no congener among the Asiatic representatives, and that most of the described African species are generically distinct from *Mycalesis*, some of them, moreover, having no affinity with that genus of *Satyrinæ*.

Group I. *With a glandular pouch and tuft on both wings.*

N. g. Virapa.

Fore wing with costa arched in the middle, apex convex, exterior margin oblique and even, posterior angle acute; costal, subcostal, and median veins swollen at the base; first subcostal branch emitted immediately before end of the cell; disco-cellulars bent inward at their middle; radials from upper near the cell. Male with a glandular patch of raised scales on the middle of submedian vein, the patch being partially covered by a tuft of long fine hairs exserted outward from each side of the vein. Hind wing oval, exterior margin convex; first subcostal in male much curved upward at the base and thence straight to apex, emitted at more than half distance before end of the cell, second very concave from

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base of first to end of the cell; upper disco-cellular outwardly convex, lower straight and oblique, radial from their middle; two upper median branches emitted at some distance beyond end of the cell. Male with a tuft of fine long hairs exserted over a glandular patch at end of subcostal vein. Eyes very slightly hairy. Antennæ with a well-formed slender club. Palpi uniformly pilose beneath to tip.

Type. *V. Anaxias.*

Virapa Anaxias.

Mycalesis Anaxias, Hewitson, Exotic Butt. iii. p. 86; *Myc.* pl. 4, figs. 25, 26 (1862).

Hab.—Darjiling (*Atkinson*); Khasia Hills (*Austen*); Nilgiris.

Virapa Radza.

Mycalesis Radza, Moore, P.Z.S., 1877, p. 583, pl. 58, fig. 1.

Hab.—Andaman Isles.

N. g. Gareris.

Wings broader than in *Virapa*. Fore wing more angular at apex, the costa much more arched, venation of male and the glandular patch of raised scales and tuft similar. Hind wing with the first subcostal branch in the male swollen beneath at its base above the cell, and covered on the upper side by a tuft of hair; the two upper median branches emitted from end of the cell. Eyes hairy.

Type. *G. Sanatana*, Moore.

Gareris Sanatana.

Mycalesis Sanatana, Moore, Catal. Lep. Mus. E. I. C. i. p. 231 (1857).

Hab.—Darjiling (*Atkinson*); Khasia Hills (*Austen*).

Gareris Francisca.

Papilio Francisca, Cramer, Pap. Exot. iv., pl. 326, f. E. F. (1780), ♀.

Hab.—China.

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Gareris Perdiccas.

Mycalesis Perdiccas, Hewitson, Exotic Butt. iii. p. 84; *Myc.* pl. 3, fig. 15 (1862).

Hab.—Japan; Shanghai.

Gareris Gopa.

Mycalesis Gopa, Felder, Reise Novara, Lep. iii. p. 501 (1867); Butler, Catal. Satyr. B. M. p. 140.

Hab.—Darjiling (*Atkinson*).

N. g. Satoa.

Male.—Wings short; fore wing more arched than in *Virapa*, apex more rounded; exterior margin less oblique; second subcostal branch emitted before end of the cell; a tuft of fine hair covering a glandular patch below submedian vein; hind wing subconical, exterior margin oblique, anal angle convex, abdominal margin short; a tuft of fine hair covering a glandular subcostal patch; cell short, broad at its end; subcostal deeply recurved at its end, first branch emitted near end of the cell, second bent downward; disco-cellulars straight, slightly oblique; middle median emitted before end of the cell. Antennæ with a slender club; palpi somewhat stout. Eyes hairy.

Satoa Maianeas.

Mycalesis Maianeas, Hewitson, Exotic Butt. iii. p. 87; *Myc.* pl. 5, figs. 27, 28 (1864), ♀; Butler, Catal. Satyr. B. M. p. 131.

Hab.—Malay Peninsula (Malacca); Borneo (Sarawak).

N. g. Sadarga.

Fore wing shorter, with more rounded and less oblique exterior margin than in *Virapa;* venation similar, but the veins more curved. Male with a slight tuft (but no perceptible glandular patch of raised scales) on submedian vein before the swollen base. Hind wing very convex externally; first subcostal in male not curved at the base; second concave at base and much swollen beneath between first and end of the cell, and with a slight tuft of hairs above; two upper median branches

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emitted from angle before end of the cell. Eyes hairy.

Type. *S. Gotama*, Moore.

Sadarga Gotama.

Mycalesis Gotama, Moore, Catal. Lep. Mus. E. I. C. i. p. 232 (1857); Butler, Catal. Satyr. B. M. p. 134.
M. borealis, Felder, Reise Novara, Lep. iii. p. 500 (1867).

Hab.—China (Shanghai); Japan.

Sadarga Madjicosa.

Mycalesis Madjicosa, Butler, Catal. Satyr. B. M. p. 137, pl. 3, fig. 10, ♀.

Hab.—Madjico-Sima.

Sadarga oculata.

Male and female.—Similar on the upper side to *S. Charaka*, the ocelli of the same large size, but the lower somewhat laterally bulged. On the under side the basal area is paler, being of a pale purplish ochreous, the discal transverse line having a much broader yellowish border; the ocelli on both wings are very prominent, and slightly larger than those in *S. Gotama*.

Expanse, ♂ $1\frac{8}{10}$, ♀ $2\frac{1}{10}$.

Hab.—N. E. India (Silhet). In Coll., F. Moore.

Sadarga Charaka.

Mycalesis Charaka, Moore, Proc. Zool. Soc. 1874, p. 566.

Hab.—N. E. India (Silhet).

N. g. Dalapa.

Fore wing more triangular than in *Gareris*, costa less arched, the exterior margin oblique. Male with a similar glandular patch of raised scales and tuft on the submedian vein, but less prominent. Hind wing not so broad, somewhat quadrate in form; exterior margin and anal angle more convex, and waved; first subcostal slightly swollen at the base beneath, tufted above; second branch with a slightly raised fold on the upper side extending from first branch to near the end. Eyes hairy. Club of antennæ thicker.

Type. *D. Sudra.*

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Dalapa Sudra.

Mycalesis Sudra, Felder, Reise Novara, Lep. iii. p. 500, pl. 67, fig. 10 (1867).

Hab.—Java; Sumatra.

N. g. Suralaya.

Fore wing comparatively long and narrow; costa slightly arched; exterior margin oblique, almost straight and even. Male with a very slight glandular patch (more distinct beneath) sparsely covered with delicate short hairs. Hind wing small, oval; exterior margin convex, waved; first subcostal branch slightly swollen at its base, second very concave at its base; cell narrow; disco-cellulars very oblique. Male with a long tuft of hair covering a glandular patch above base of first subcostal branch. Eyes almost naked. Antennal club slender.

Type. *S. Orseis.*

Suralaya Orseis.

Mycalesis Orseis, Hewitson, Exotic Butt. iii. p. 89, *Myc.* pl. 6, fig. 36, 37 (1864); Butler, Catal. Satyr. B. M. p. 136.

Hab.—Sumatra; Borneo.

Genus Orsotriæna.

Orsotriæna, Wallengren, Kongl. Vet. Akad. Förh. xv. p. 79 (1858).

Fore wing comparatively shorter, exterior margin less oblique, apex and posterior angle convex; costal vein only, in both sexes, swollen at the base. Male with a tuft of fine hairs covering a glandular patch above the base of submedian vein. Hind wing less arched at the base, anal angle convex; first subcostal branch emitted immediately before end of the cell, middle median also emitted before lower end of the cell. Male with no erectile tuft at the base of subcostal, being replaced by a slight tuft of more delicate and recumbent hairs above and below the median vein. Eyes naked.

Type. *O. Medus.*

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Orsotriæna Medus.

Papilio Medus, Fabricius, Syst. Ent. p. 488 (1775).
P. Hesione, Cramer, Pap. Exot. i. pl. 11, fig. c, d (1775).
Mycalesis Hesione, Hübner, Verz. Vek. Schmett. p. 55; Hewits. Journ. Linn. Soc. Zool. viii. p. 146; Butler, Catal. Fabr. Lep. B. M. p. 34.
Orsotriæna Hesione, Wallengren, Kongl. Vet. Akad. xv. p. 80.
Papilio Doris, Cramer, Pap. Exot. iv. pl. 362, fig. c (1782).
P. Hamilcar, Herbst, Naturs. Schmett. viii. p. 73, pl. 193, fig. 3 (1796).
Mycalesis cinerea, Butler, Ann. Nat. Hist. 1867, p. 401, pl. 8, f. 9.

Hab.—India (Gangetic Plains); British Burmah; Malay Peninsula; Nicobars; Singapore; Sumatra; Java; Flores; Timor; Macassar; Borneo (Sarawak).

Orsotriæna mutata.

Mycalesis mutata, Butler, Proc. Zool. Soc. 1875, p. 612.

Hab.—New Hebrides; New Ireland.

Orsotriæna mandata.

Mycalesis mandata, Moore, Catal. Lep. Mus. E. I. C. i. p. 233 (1857); Butler, Catal. Satyr. B. M. p. 139.
M. Gamaliba, Butler, Ann. Nat. Hist. 1867, pl. 2, fig. 3, 3. a, b.

Hab.—S. India (Malabar); Ceylon.

Orsotriæna mandosa.

Mycalesis mandosa, Butler, Catal. Satyr. Brit. Mus. p. 139, pl. 3, fig. 9 (1868).

Hab.—S. India (Malabar).

Orsotriæna Runeka.

Mycalesis Runeka, Moore, Catal. Lep. Mus. E. I. C. i. p. 234 (1857).

Hab.—N. India (Darjiling, Cherra, Calcutta, Deyra Doon); British Burmah; Hainan.

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Orsotriæna Jopas.

Mycalesis Jopas, Hewitson, Exotic Butt. iii. *Myc.* pl. 4, fig. 24 (1864).

Hab.—Macassar; Tondano; Sula.

Group II. *With a glandular pouch and tuft on hind wing only.*

N. g. Calysisme.

Mycalesis (part), Hübner, &c.

Wings short, broad. Fore wing with the costa arched at base, apex acute in male, less so in female, exterior margin oblique and curved, posterior angle acute; costal, median, and submedian veins swollen at the base; second subcostal branch emitted immediately before end of the cell; cell broad; disco-cellulars very concave, radials from two angles in upper near subcostal. Hind wing oval; costa arched at base; exterior margin convex, dentate; first subcostal branch emitted and swollen before end of the cell; disco-cellulars slightly concave, radial from their middle; two upper median branches from end of the cell; male with a tuft of long hairs at base of subcostal covering a glandular patch of scales. Body slender; palpi porrect, slender, finely pilose beneath; legs slender. Eyes hairy. Antennæ slender at tip.

Type. *C. Drusia.*

Calysisme Drusia.

Papilo Drusia, Cramer, Pap. Exot. i. pl. 84, fig. c, d (1875), ♀.

Mycalesis Drusia, Butler, Catal. Satyr. B. M. p. 133; *id.*, Catal. Fabr. Lep. B. M. p. 33.

Hab.—India (Bengal); Andaman and Nicobar Isles; China (Cramer).

Calysisme Justina.

Papilio Justina, Cramer, Pap. Exot. iv. pl. 326, fig. c (1780).

Mycalesis Justina, Hübner, Verz. bek. Schmett. p. 55; Butler, Catal. Satyr. B. M. p. 135.

Hab.—S. India (Malabar).

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Calysisme Mamerta.

Papilio Mamerta, Cramer, Pap. Exot. iv. pl. 326, fig. D (1780).

Mycalesis Mamerta, Butler, Catal. Satyr. B. M. p. 136.

Hab.—China (Cramer); Formosa (Swinhoe).

Calysisme Mineus.

Papilio Mineus, Linnæus, Syst. Nat. i. ii. p. 768 (1767); Fabricius, Syst. Ent. p. 488.

Mycalesis Mineus, Butler, Catal. Satyr. B. M. p. 135; *id.*, Catal. Fabr. Lep. B. M. p. 34.

Hab.—India (Bombay); Ceylon; Java; Hong-Kong.

Calysisme Polydecta.

Papilio Polydecta, Cramer, Pap. Exot. ii. pl. 144, fig. E, F (1777).

Mycalesis Polydecta, Butler, Ann. Nat. Hist. 1867, p. 402, pl. 9, f. 5, 6 ♀; Catal. Satyr. B. M. p. 135.

Hab.—Borneo. [Tranquebar, Cramer.]

Calysisme Igoleta.

Mycalesis Igoleta, Felder, Wien. Ent. Monats. vii. p. 127 (1863); Butler, Catal. Satyr. B. M. p. 133.

Hab.—Philippines (Luzon).

Calysisme Nautilus.

Mycalesis Nautilus, Butler, Ann. Nat. Hist. 1867, p. 402, pl. 9, f. 7; *id.*, Catal. Satyr. B. M. p. 136.

Hab.—Malacca.

Calysisme Justinella.

Mycalesis Justinella, Butler, Catal. Satyr. B. M. p. 135, pl. 3, fig. 12 (1868).

Hab.—Philippines.

Calysisme Blasius.

Papilio Blasius, Fabricius, Ent. Syst. Suppl. p. 426 (1798).

Mycalesis Blasius, Butler, Proc. Zool. Soc. 1867, p. 720, fig. 4; *id.*, Catal. Satyr. B. M. p. 137; *id.*, Catal. Fabr. Lep. B. M. p. 34.

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M. lurida, Butler, Trans. Ent. Soc. Lond. 1879, p. 3, ♂.

Hab.—India (Cachar); Pegu; Ceylon; Singapore; Java; Formosa; Philippines.

Calysisme Samba.

Mycalesis Samba, Moore, Catal. Lep. Mus. E. J. C. i. p. 233 (1857); Butler. Catal. Satyr. B. M. p. 137.

Hab.—India (Calcutta).

Calysisme Lalassis.

Mycalesis Lalassis, Hewitson, Exotic Butt. iii. p. 89, *Myc.* pl. 6, fig. 35 (1864); Journ. Linn. Soc. Zool. viii. p. 147; Butler, Catal. Satyr. B. M. p. 137.

Hab.—Gilolo; Amboyna.

Calysisme Cepheus.

Mycalesis Cepheus, Butler, Ann. Nat. Hist. 1867, p. 402, pl. 9, fig. 3, 4 ♀; *id.*, Catal. Satyr. B. M. p. 134.

Hab.—Penang.

Calysisme lugens.

Mycalesis lugens, Butler, Proc. Zool. Soc. 1875, p. 612.

Hab.—New Hebrides.

Calysisme Zia.

Mycalesis Zia, Butler, 'Entomologist' iv. p. 347 (1869).

Hab.—Australia (Queensland).

Calysisme Perseus.

Papilio Perseus, Fabricius, Syst. Ent. p. 488 (1775), ♀; Donovan, Ins. New Holl. pl. 26, f. 3.

Mycalesis Perseus, Butler, Proc. Zool. Soc. 1867, p. 718, fig. 2; Catal. Satyr. B. M. p. 133; Catal. Fabr. Lep. B. M. p. 33.

Papilio otrea, Cramer, Pap. Exot. iv. pl. 314, fig. A B (1780), ♀.

P. Tabitha, Fabricius, Ent. Syst. iii. i. p. 243 (1793).

Satyrus Zopyrus, Kollar, in Hugel's Reise Kaschmir, iv. p. 450 (1844).

Hab.—India (Bombay; Deyra Doon; Simla; Oudh; Calcutta).

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Calysisme indistans, n. sp.

Differs from *C. Perseus* in having a more distinctly-pointed apex and straighter exterior margin, resembling in these respects *C. visala*; the colour is uniformly much paler above; the under side is especially paler, the transverse discal pale-bordered line more even, and that on the fore wing is slightly curved inward, the marginal spots are less prominent, or only visible as white spaces, and sometimes are quite obsolete.

Expanse, ♂ 1⅝ ♀ 2 in.

Hab.—Calcutta. In coll. F. Moore.

Calysisme Ostrea.

Mycalesis Ostrea, Hübner, Exot. Schmett. Zuträge, fig. 79, 80, ♂; Moore, P. Z. S. 1874, p. 566 (note) nec Cramer.

M. Ostrea, Westwood, Gen. Diurn. Lep. p. 394 (1851).

Hab.—China; Hainan (Swinhoe).

Calysisme Visala.

Mycalesis Visala, Moore, Catal. Lep. Mus. E. J. C. i. p. 230 (1857); Butler, Catal. Satyr. B. M. p. 133.

Hab.—India (Sikkim).

N. g. Jatana.

Male.—Wings short; fore wing narrow, very much arched at base, apex convex; exterior margin oblique, straight. Hind wing somewhat quadrate; costa very convex in the middle, apex slightly angular; exterior margin oblique, slightly convex, anal angle prolonged; abdominal margin long; a tuft of fine hair at base of subcostal; cell short and broad at the end; subcostal straight at its base, first branch emitted near end of the cell, second straight at its base; upper disco-cellular straight, lower slightly curved and oblique; two upper median branches from end of the cell. Antennæ with a stout club; palpi pilose to the tip. Eyes slightly hairy.

Jatana Mynois.

Mycalesis Mynois, Hewitson, Exotic Butt. iii.; *Myc.* pl. 5, fig. 29, 30 (1864); Butler, Catal. Satyr. B. M. p. 144.

Hab.—Timor.

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Genus Culapa.

Culapa, Moore, P. Z. S. 1878, p. 825.

Fore wing longer than in *Calysisme*; costa very slightly arched, apex produced, exterior margin very oblique and slightly convex below the apex; cell longer and narrower; third subcostal branch nearer the fourth. Hind wing somewhat quadrate, apical angle slightly acute, exterior margin convex hindward and truncated at anal angle, abdominal margin long; cell triangular; disco-cellulars very oblique; middle median branch emitted at some distance before lower end of the cell. Male with a tuft of fine hair exserted from base of cell and covering a small glandular patch above base of first subcostal branch. Antennæ with a well-formed, slightly-stout club. Palpi compactly clothed with shorter hair. Eyes hairy.

Culapa Mnasicles.

Mycalesis Mnasicles, Hewitson, Exotic Butt. iii.; *Myc.* pl. 5, fig. 33, 34 (1864); Butler, Catal. Satyr. B. M. p. 141.

Culapa Mnasicles, Moore, Proc. Zool. Soc. 1878, p. 825.

Hab.—Sumatra; Burmah (Tenasserim; Moulmain).

N. g. Pachama.

Wings large and broad, but comparatively shorter than in *Samanta*. Fore wing with costa arched in the middle, apex rounded, exterior margin slightly oblique and convex, cilia prominent. Hind wing somewhat bluntly conical, exterior margin slightly arched, apex somewhat angled, exterior margin very oblique and scarcely convex; cilia prominent; first subcostal emitted at some distance before end of the cell; cell longer, end much pointed; disco-cellulars very oblique, radial from a slight angle near subcostal. Male with a subcostal tuft and glandular patch, as in *Samanta*. Palpi slender at tip. Eyes hairy. Antennal club gradually formed.

Pachama Mestra.

Mycalesis Mestra, Hewitson, Exotic Butt. iii. p. 79; *Myc.* pl. 1, fig. 2 (1862); Butler, Catal. Satyr. B. M. p. 137.

Hab.—E. Bengal (Khasia Hills).

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N. g. INDALASA.

Male.—Fore wing somewhat narrow; costa arched at base, apex convex; exterior margin oblique, straight; hind wing narrow, conical; anterior margin arched at base, apex slightly produced; exterior margin oblique, slightly convex; cell long, fusiform; a fuft of fine hair at base of subcostal; first subcostal branch half way between the costal and second; disco-cellulars very oblique; two upper median branches from end of the cell. Antennæ with a moderately formed club. Palpi pointed and hairy to tip. Eyes slightly hairy.

Indalasa Moorei.

Mycalesis Moorei, Felder, Reise Novara, Lep. iii. p. 502, pl. 67, fig. 9 (1867).

Hab.—Java.

N. g. SAMANTA.

Fore wing arched towards the apex, angle convex. Hind wing conical; exterior margin waved; first and second subcostal branches emitted together from end of the cell, base of the first straight; disco-cellulars straight and very slightly oblique; cell short; male with a small tuft covering a glandular patch of scales above base of subcostal branch. Eyes hairy.

Type. *S. Malsara.*

Samanta Malsara.

Mycalesis Malsara, Moore, Catal. Lep. Mus. E. I. C. i. p. 231 (1857); Hewitson, Exotic Butt. iii. p. 80; *Myc.* pl. 1. figs. 5, 6.

Hab.—N. E. India (Darjiling; Cherra).

Samanta rudis, n. sp.

Male.—Upper side similar to *S. Malsara*, the pale band on the fore wing being narrower. Under side ochreous-brown, with darker brown strigæ, somewhat greyish brown on external borders; both wings with an ochreous-yellow transverse discal band, the inner margin of which is well defined, the outer suffused; a submarginal series of minute indistinct white-speckled spots,

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the two subanal being ringed with black; an indistinct ochreous-speckled pale streak crossing middle of the cell on both wings.

Expanse, $1\frac{3}{4}$ inch.

Hab.—N. India. In coll. F. Moore.

Samanta Lepcha, n. sp.

Male.—Upper side brown; fore wing with an indistinct pale transverse discal narrow line, and two or three submarginal indistinct blind ocelli, the upper two minute; hind wing with one or two similar subanal ocelli. Under side brighter coloured, greyish externally, covered with numerous darker brown strigæ; both wings with a prominent very narrow ochreous-yellow transverse discal band, and a submarginal series of indistinct minute black and white speckled spots; a pale speckled indistinct streak crossing both cells.

Expanse, 2 inches.

Hab.—Nepal (General Ramsay.) In coll. F. Moore.

Samanta Heri.

Mycalesis Heri, Moore, Catal. Lep. Mus. E. I. C. i. p. 233 (1857), ♀; Butler, Catal. Satyr. B. M. p. 134.

Hab.—N. E. India.

Samanta Nicotia.

Mycalesis Nicotia, Hewitson, Gen. Diurn. Lep. p. 394, pl. 66, f. 4 (1851), ♀; *id.*, Exotic Butt. iii. *Myc.* pl. 1, f. 1, ♂; Butler, Catal. Satyr. B. M. p. 139.

Hab.—N. E. India (Darjiling).

N. g. Telinga.

Fore wing comparatively long and narrow, apex slightly convex, exterior margin oblique, nearly straight, posterior margin convex near the base; cell long. Hind wing broad, somewhat quadrate; costa arched at base and thence straight to apex; exterior margin waved, convexly angular in the middle, anal angle convex; cell broad, triangular; disco-cellulars very long and oblique; second subcostal emitted just before end of the cell;

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upper and middle median branches from lower end of the cell. Male with a small subcostal tuft and glandular patch. Palpi stout at tip. Eyes hairy. Club of antenna well formed.

Telinga Adolphei.

Satyrus Adolphei, Guérin, Delessert's Souv. Voy. Inde, p. 76 (1843).

Mycalesis Adolphei, Westwood and Hewits. Gen. D. Lep. p. 394; Butler, Catal. Satyr. B. M. p. 139.

M. Onatas, Hewitson, Exotic Butt. iii. p. 90; *Myc.* pl. 6, fig. 40 (1864).

Hab.—South India (Nilgiris).

N. g. KABANDA.

Wings short, broad. Fore wing very much arched from the base, apex and exterior margin slightly convex and even; cell short and broad. Hind wing bluntly conical, short; exterior margin almost even, anal angle very convex; costal vein quite short and nearly straight; first subcostal branch emitted immediately before end of the cell; disco-cellulars almost erect; cell very short; middle median branch emitted before lower end of the cell; male with a slight subcostal tuft and glandular patch of scales; median branches dilated and grooved at their base on the upper side. Antennæ short, slender. Eyes hairy. Palpi slender at tip.

Type. *K. Malsarida.*

Kabanda Malsarida.

Mycalesis Malsarida, Butler, Catal. Satyr. B. M. p. 134, pl. 3, fig. 14 (1868).

Hab.—E. Bengal (Khasias; Cherra Punji).

Kabanda Khasiana.

Mycalesis Khasiana, Moore, Proc. Zool. Soc. 1874, p. 566.

Hab.—E. Bengal (Khasia Hills).

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N. g. MARTANDA.

Wings short. Fore wing somewhat triangular, apex slightly pointed, exterior margin slightly oblique, nearly straight and even. Hind wing bluntly oval; costa very broadly convex at the base; exterior margin convex, slightly waved; cell long, very pointed at lower end; first and second subcostal branches from end of the cell; disco-cellulars very oblique; male with a double subcostal tuft covering the glandular patch of scales. Antennæ short, club stout. Eyes hairy. Palpi slender at tip.

Type. *M. Janardana.*

Martanda Janardana.

Mycalesis Janardana, Moore, Catal. Lep. Mus. E. I. C. i. p. 234 (1857); Butler, Catal. Satyr. B. M. p. 136.

Hab.—Java; Sumatra; Malacca.

Martanda Megamede.

Mycalesis Megamede, Hewitson, Exotic Butt. iii. p. 84; *Myc.* pl. 3, fig. 14 (1862); Butler, Catal. Satyr. B. M. p. 136 (Journ. Linn. Soc. Zool. viii. p. 147).

Hab.—Macassar; Ternate; Gilolo; Batchian.

Martanda Sangaica.

Mycalesis Sangaica, Butler, Ann. Nat. Hist. 1877, p. 95.

Hab.—N. China (Shanghai).

N. g. NISSANGA.

Wings short. Fore wing slightly arched at the base, exterior margin long, slightly convex, and nearly erect; second subcostal emitted at end of the cell. Hind wing bluntly conical; costa broadly convex at the base and thence oblique to the apex; exterior margin oblique; cell short, quadrate, broad at its end; subcostal not swollen, its first branch emitted immediately before end of the cell; disco-cellulars erect, equal in length; two upper median branches emitted at some distance beyond the cell; male with a tuft of fine hair covering a glandular patch at base of subcostal branches. Antennæ gradually thickened to tip. Eyes hairy. Apical joint of palpi long and slender.

Type. *N. Patnia*, Moore.

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Nissanga Patnia.

Mycalesis Patnia, Moore, Catal. Lep. Mus. E. J. C. i. p. 232, ♂ (1857); Butler, Catal. Satyr. B. M. p. 146.

Hab.—Ceylon.

Nissanga Junonia.

Mycalesis Junonia, Butler, Catal. Satyr. B. M. p. 146, pl. 3, fig. 4 (1868).

Hab.—S. India (Nilgiris).

N. g. Mydosama.

Dasyomma,* Felder, Wien. Ent. Monats. iv. p. 401 (1860).

Wings short. Fore wing regularly arched along the costa; exterior margin slightly convex and oblique; second subcostal branch emitted immediately before end of the cell; disco-cellulars very slightly concave. Hind wing bluntly conical; costa convex; exterior margin and angles convex, slighly waved; cell broadly triangular; first subcostal branch emitted close to end of the cell, and in the male swollen at its base; disco-cellulars oblique, slightly concave; two upper median branches emitted from end of the cell. Male with a tuft of fine hair covering a glandular patch at base of first subcostal branch. Eyes hairy. Antennal club moderate. Palpi less laxly clothed beneath than in *Nissanga*, and the terminal joint shorter.

Type. *M. fuscum.*

Mydosana fuscum.

Dasyomma fuscum, Felder, Wien. Ent. Monats. iv. p. 401 (1860).

Mycalesis fuscum, Butler, Catal. Satyr. B. M. p. 144.

M. Diniche, Hewitson, Exotic Butt. iii. p. 85, *Myc.* pl. 4, fig. 23 (1862), ♂; *id.*, Journ. Linn. Soc. Zool. viii. p. 146.

M. Margites, Hewitson, *l.c.*, v. *Myc.* pl. 9, f. 59 (1874), ♀.

Hab.—Malay Peninsula; Singapore; Sumatra; Borneo.

* Previously used (1840) in Diptera.

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Mydosama Anapita.

Mycalesis Anapita, Moore, Catal. Lep. Mus. E. I. C. i. p. 232 (1857); Hewitson, Journ. Linn. Soc. Zool. viii. p. 146; Butler, Catal. Satyr. B. M. p. 146.

Hab.—Borneo; Sumatra.

Mydosama Remulia.

Papilio Remulia, Cramer, Pap. Exot. iii. pl. 237, f. F G (1779).

Mycalesis Remulia, Hewitson, Journ. Linn. Soc. Zool. viii. p. 145; Butler, Catal. Satyr. B. M. p. 143.

Hab.—Java; Bouru; Amboyna; Ceram; Mysol; Waigiou; Salwatty; Gilolo; Ternate; Batchian; Morty.

Mydosama Terminus.

Papilio Terminus, Fabricius, Syst. Ent. p. 488 (1775); Donovan, Ins. New Holl. pl. 28, fig. 4.

Mycalesis Terminus, Butler, Proc. Zool. Soc. 1867, p. 720, fig. 3, 3A; Catal. Satyr. B. M. p. 143; Catal. Fabr. Lep. B. M. p. 35.

Hab.—Australia (New Holland).

Mydosama flagrans.

Mycalesis flagrans, Butler, Ann. Nat. Hist. 1876, p. 243.

Hab.—New Guinea.

Mydosama Cacodemon.

Mycalesis Cacodemon, Kirsch, Mitth. Mus. Dresden, i. p. 118, pl. 6, f. 5, 5A (1877).

Hab.—New Guinea.

Mydosama Messene.

Mycalesis Messene, Hewitson, Exotic Butt. iii. p. 81, *Myc.* pl. 2, fig. 8, 9 (1862); Journ. Linn. Soc. Zool. viii. p. 145; Butler, Catal. Satyr. B. M. p. 142.

Hab.—Ternate; Batchian; Gilolo; Morty.

Mydosama Mehadeva.

Satyrus Mehadeva, Boisduval, Voy. Astrolabe, Lep. p. 151 (1832).

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Mycalesis Mehadeva, Hewitson, Journ. Linn. Soc. Zool. viii. p. 145; Butler, Catal. Satyr. B. M. p. 143.

Hab.—Dorey.

Mydosama Asophis.

Mycalesis Asophis, Hewitson, Exotic Butt. iii. p. 85, *Myc.* pl. 4, fig. 20, 21 (1862); Journ. Linn. Soc. Zool. viii. p. 145; Butler, Catal. Satyr. B. M. p. 144.

Hab.—New Guinea; Waigiou; Mysol; Ternate.

Mydosama Æthiops.

Mycalesis Æthiops, Butler, Catal. Satyr. B. M. p. 141, pl. 3, fig. 11 (1868).

Hab.—New Guinea.

Mydosama Bazochi.

Satyrus Bazochii, Guérin, Voy. Coquille, Atlas, Ins. pl. 14 A, f. 3, (1829).

Mycalesis Bazochii, Kirby, Catal. D. Lep. 91.

Satyrus Cyamites, Boisduval, Voy. Astrolabe, Lep. p. 152 (1832).

Mycalesis Cyamites, Hewitson, Journ. Linn. Soc. Zool. viii. p. 145; Butler, Catal. Satyr. B. M. p. 142.

Hab.—Dorey.

Mydosama Ita.

Mycalesis Ita, Felder, Wien. Ent. Monats. vii. p. 125 (1863); Reise Novara Lep. iii. pl. 68, fig. 8, 9; Butler, Catal. Satyr. B. M. p. 145.

Hab.—Philippines (Luzon).

Mydosama Felderi.

Mycalesis Felderi, Butler, Catal. Satyr. B. M. p. 144, pl. 3, fig. 5 (1868).

Hab.—Philippines.

Mydosama Itys.

Mycalesis Itys, Felder, Reise Novara Lep. iii. p. 503; Butler, Catal. Satyr. B. M. p. 145.

Hab.—Celebes.

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Mydosama Sirius.

Papilio Sirius, Fabricius, Syst. Ent. p. 488 (1775); Donovan, Ins. New Holl. pl. 28, fig. 3.

Mycalesis Sirius, Butler, P. Z. S. 1867, p. 720, fig. 1; *Id.* Catal. Satyr. B. M. p. 144; *Id.* Catal. Fabr. Lep. B. M. p. 35.

Hab.—Australia (New Holland).

Mydosama Zachæus.

Papilio Zachæus, Fabricius, Ent. Syst. iii. 1, p. 217 (1793).

Hab.—Australia.

Mydosama Manipa.

Satyrus Manipa, Boisduval, Voy. Astrolabe, Lep. p. 150 (1832).

Mycalesis Manipa, Hewitson, Journ. Linn. Soc. Zool. viii. p. 146.

Mycalesis Daidis, Hewitson, Exotic Butt. iii. p. 85, *Myc.* pl. 4, fig. 22 (1862).

Hab.—Bouru; Amboyna; Ceram.

Mydosama Shiva.

Satyrus Shiva, Boisduval, Voy. Astrolabe, Lep. p. 149 (1832).

Mycalesis Shiva, Butler, Catal. Satyr. B. M. p. 143.

Hab.—New Guinea (Dorey).

Mydosama Phidon.

Mycalesis Phidon, Hewitson, Exotic Butt. iii. p. 84, *Myc.* pl. 3, fig. 16 (1862); Journ. Linn. Soc. Zool. viii. p. 146; Butler, Catal. Satyr. B. M. p. 141.

Hab.—Aru.

Mydosama Cæsonia.

Mycalesis Cæsonia, Wallengren, Wien. Ent. Monats. 1860, p. 36.

Hab.—Manilla.

N. g. NEBDARA.

Male. Wings short, broad; fore wing with the costa arched, apex slightly convex; exterior margin oblique, nearly straight; hind wing with the costa arched at

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the base; exterior margin convex hindward, waved; abdominal margin long; cell long; subcostal vein slightly swollen before emitting the first branch, the first branch emitted before upper half length of the cell; disco-cellulars long, very oblique; middle median branch emitted before lower end of the cell; a tuft of fine hair at base of subcostal. Antennæ with a gradually formed club. Third joint of palpi long, slender. Eyes hairy.

Type. *N. Tagala.*

Nebdara Tagala.

Mycalesis Tagala, Felder, Wien. Ent. Monats. vii. p. 126 (1863); Reise Novara, Lep. iii. pl. 67, fig. 7, 8; Butler, Catal. Satyr. B. M. p. 143.

Hab.—Philippines (Bourias Loeban, Mindanao).

Nebdara Bisaya.

Mycalesis Bisaya, Felder, Wien. Ent. Monats. vii. p. 127 (1863); Butler, Catal. Satyr. B. M. p. 143.

M. Semperi, Butler, Catal. Satyr. B. M. p. 137, pl. 3, fig. 7 (1868) ♂.

M. Mareotis, Hewitson, Exotic Butt. iii. p. *Myc.* pl. 9, fig. 58 ♀ (1874).

Hab.—Philippines (Bourias, Loeban, Luzon).

Nebdara Amœna.

Mycalesis Amœna, Druce, Proc. Zool. Soc. 1873, p. 339, pl. 32, fig. 1.

Hab.—Borneo.

N. g. Sevanda.

Fore wing more lengthened than in *Mydosama*; apex somewhat produced, exterior margin very oblique; disco-cellulars deeply concave. Hind wing broad, bluntly oval; cell very broad; first subcostal branch emitted at some distance before end of the cell; disco-cellulars slightly oblique; upper median branch emitted from end of the cell, middle branch immediately before the end; male with the first subcostal branch swollen beneath at its base, with a tuft of fine hairs above covering the glandular patch. Antennæ and palpi stouter. Eyes hairy.

Type. *S. Duponcheli.*

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Sevanda Duponcheli.

Satyrus Duponchelii, Guérin, Voy. Coquille, pl. 17, fig. 3 (1829), ♂.

S. Dorycus, Boisduval, Voy. Astrolabe, Lep. p. 152 (1832).

Mycalesis Dorycus, Hewitson, Exotic Butt. iii. p. 81, *Myc.* pl. 2, figs. 7, 10; Journ. Linn. Soc. Zool. viii. p. 145; Butler, Catal. Satyr. B. M. p. 141.

M. Getulia, Felder, Wien. Ent. Monats. iii. p. 404 (1859), ♂.

Hab.—Dorey; Aru.

Sevanda Mucia.

Mycalesis Mucia, Hewitson, Exotic Butt. iii. p. 82, *Myc.* pl. 2, figs. 11, 12 (1862); Butler, Catal. Satyr. B. M. p. 142; Kirsch, Mitth. Zool. Mus. Dresden, i. p. 118.

Hab.—Aru.

N. g. Lohora.

Wings broader than in *Sevandra*. Fore wing convex at the base and apex, exterior margin convex and slightly oblique; second subcostal branch emitted at some distance beyond end of the cell; lower disco-cellular extremely concave. Hind wing broadly oval; costa nearly straight to apex; exterior margin convex; first subcostal branch emitted at half length of the cell; disco-cellulars obliquely concave; two upper median branches from end of the cell. Male with a tuft of fine hairs covering a small glandular patch at base of subcostal branch. Antennæ with a gradually thickened club. Palpi compactly clothed to the tip beneath. Eyes hairy.

Type. *L. Dexamena.*

Lohora Dexamena.

Mycalesis Dexamenus, Hewitson, Exotic Butt. iii. p. 83, *Myc.* pl. 3, figs. 17, 18 (1862); Journ. Linn. Soc. Zool. viii. p. 146; Butler, Catal. Satyr. B. M. p. 142.

Hab.—Tondano.

Lohora Dinon.

Mycalesis Dinon, Hewitson, Exotic Butt. iii. p. 88, *Myc.* pl. 5, fig. 31 (1864); Journ. Linn. Soc. Zool. viii. p. 146; Butler, Catal. Satyr. B. M. p. 142.

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M. Dexamenus (part), Hewits., Exotic Butt. iii., *Myc.* pl. 3, fig. 19.

Hab.—Macassar.

Lohora Deianira.

Mycalesis Deianira, Hewitson, Exotic Butt. iii. p. 83, *Myc.* pl. 3, fig. 13 (1862); Butler, Catal. Satyr. B. M. p. 142.

M. Dora, Hewitson, Exotic Butt. iii. p. 88 (1864); Journ. Linn. Soc. Zool. viii. p. 146.

Hab.—Tondano.

N. g. NASAPA.

Male.—Fore wing slightly arched at the base and before the apex; exterior margin oblique, slightly convex below the apex; hind wing oval; costa arched from the base; exterior margin and anal angle convex; a tuft of fine hair covering a subcostal patch; cell short; first and second subcostal branches at equal distances from the costal; upper disco-cellular oblique, slightly concave, lower nearly erect; two upper median branches from end of the cell. Antennæ gradually clavate; palpi laxly pilose beneath, tip rather short, pointed. Eyes hairy.

Nasapa Aramis.

Mycalesis Aramis, Hewitson, Exotic Butt. iii. p. 91, *Myc.* pl. 7, fig. 43 (1866); Butler, Catal. Satyr. B. M. p. 129.

Hab.—Philippines.

Genus MYCALESIS.

Mycalesis, Hübner, Verz. bek. Schmett. p. 55 (1816).

Fore wing much arched at the base, apex slightly acute; exterior margin convex, oblique; hind wing broadly conical; costa convex in middle, apex and exterior margin convex; anal angle produced; abdominal margin long; cell narrow; first and second subcostal branches emitted together from a foot-stalk above middle of the cell, the foot-stalk swollen; a tuft of fine hair covering a glandular patch at swollen base of subcostal branches; disco-cellulars very long and oblique; two upper median branches from end of the cell. Antennal club well formed; palpi stout, pilose. Eyes naked.

Type. *M. Evadne*, Cramer.

Hab.—W. Africa.

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Group III. *With two glandular pouches and tufts on hind wing.*

N. g. LOESA.

Male.—Fore wing somewhat elongated and narrow; costa arched at the base and apex; exterior margin oblique, slightly convex; second subcostal branch emitted at some distance beyond the cell; hind wing bluntly ovate; costa arched at base; apex, exterior margin and anal angle convex; a tuft of fine hair at base of subcostal, and a slender tuft covering a groove on middle of submedian vein; cell short, broad in the middle; subcostal concave at its base, first branch emitted close to end of the cell, second concave at its base; discocellulars long, oblique, straight; two upper median branches from end of the cell. Antennæ with a well-formed terminal club; palpi pointed at tip. Eyes hairy.

Loesa Oroatis.

Mycalesis Oroatis, Hewitson, Exotic Butt. iii. p. *Myc.* pl. 6, figs. 38, 39 (1864); Butler, Catal. Satyr. B. M. p. 138.

Hab.—Java.

Species not examined, and of which the genus is therefore undeterminable:—

Mycalesis Nala, Felder, Wien. Ent. Monats. iii. p. 403 (1859).

Hab.—Java.

Mycalesis Pandæa, Hopff. Stett. Ent. Zeit., 1874, p. 39.

Hab.—Celebes.

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XIV. *On the* Buprestidæ *from Madagascar.*

By Chas. O. Waterhouse.

[Read October 6th, 1880.]

Recently M. James Thomson has published* a paper on the *Buprestidæ* from Madagascar usually included in the genus *Psiloptera*. He distributes the species known to him under eighteen subgenera, sixteen of which are new. Whether this is a desirable step or not is a matter of opinion, but for my own part I think it is to be regretted. In this paper I have placed the species under these various genera so far as is practicable, but not in the order given by M. Thomson, as he appears to have overlooked the relationship of the species with those from Africa. I think that there can be no doubt that whatever arrangement may be adopted for the Madagascar species, *Psiloptera albosparsa*, Fairm., should be placed in proximity to the African species; *Psiloptera sternalis*, Fairm., *Alampetis soror*, Thomson, following then in natural order. *Psiloptera analis*, Chev., is placed by M. Thomson under his genus *Cornelia* with *propyga*, Coq., with which it has little in common, and is separated by the genus *Pycnobothris*, Th. (with fifteen species), from *Cassidabothris colliciata*, Gory, to which it is undoubtedly most nearly allied.

Pycnobothris, Th., and *Coccinellopsis*, Th., must not be separated by *Cassidabothris*, Th.; in fact, *Coccinellopsis auropicta*, Gory, and *C. mystica*, Th., are closely allied to *Pycnobothris subsilphoides*, Th., *P. ruficauda*, Th., &c., agreeing both in general coloration and in having the prosternal process densely punctured and pilose in the males and smooth (or only sparingly punctured) in the females.

The new species described in this paper were chiefly collected by the Rev. W. Deans Cowan in the neighbourhood of Fianarantsoa; some by the Rev. C. Shaw, chiefly in the Ankafina Forest, N.E. of Fianarantsoa; a few were obtained by Mr. Kingdon east of Antananarivo;

* Rev. et Mag. de Zool., 1878.

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and lastly, some collected by the Rev. Robert Toy at Antananarivo. Of these correspondents Mr. Cowan only remains in Madagascar; Mr. Shaw and Mr. Kingdon have returned home. Mr. Toy, who laboured as Senior Tutor of the Theological and Secular College, after having resided in the island since 1862, at length broke down under his constant labours and the effects of the trying climate, and after a severe illness, from which he only partially recovered, he died on his passage home, south of Madeira, on the 19th of April of the present year.

Without enumerating all the species, I here give the following typical forms arranged in the order which appears to me to be the most natural:—

Alampetis albosparsa, Fairm.
„ soror, Th.
„ zivetta, Klug.
Apatea Luczotii, Guérin.
Amphisbeta navicularis, Gory.
Hemisobothris quadricollis, Gory.
Laconides aureopilosa, Guérin.
Palæobothris ochreata, Oliv.
Phobetodes Goryi, Guérin.
Enharpya amorpha, Gory.
Carcinias scapularis, Guérin.
Polybothris sumptuosa, Gory.
Erebodes Jansonii, Th.
Coccinellopsis Lafertei, Gory.
Coccinellopsis emarginata, Gory.
„ complanata, Gory.
„ solea, Klug.
„ auropicta, Gory.
[Pycnobothris] subsilphoides, Th.
„ cuprifera, Lap. & Gy.
„ crassa, Waterh.
(Coccinellopsis) Klugii, Gory.
„ convexa, Lap. & Gory.
Cassidabothris colliciata, Gory.
„ analis, Chev.
Cornelia pyropyga, Coq.
Aplax obscura, Th.
Icaria alata, Gory.

In describing the following new species in the British Museum collection, I have placed them, to the best of my judgment, under the subgenera proposed by M. Thomson, but some of them are very difficult to locate:—

Alampetis ? scintillans, n. sp.

Allied to *P. zivetta*, Klug, but much less convex, and in general outline somewhat resembling *P. impressipennis*. Thorax rather more narrowed in front than in *zivetta*, more distinctly keeled at the sides; deep olive-green, with only one raised median line, the disk rather sparingly punctured with large punctures; the impressed portion within the lateral margin is closely punctured nearly as in *zivetta*. The elytra somewhat resemble those of *impressipennis* in general outline, but the shoulders are a little expanded, and the lateral region from the shoulder to rather behind the middle is impressed, and the margin about the middle is slightly reflexed; the colour is more golden green and brighter than in *zivetta*,

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and there is a little coppery tint at the apex; on the back there are a few dark purple spots, and a little way from the apex there is one on the margin; the apex is slightly truncate, and the outer tooth is seen with much difficulty. The sculpture is as follows: there is a prominent costa next the suture, which becomes obliterated some distance from the apex; next to this is a less elevated costa, which extends to the apex, but is frequently interrupted by round rugulose impressions; then there is a prominent costa which is obscure at the base, but which extends nearly to the apex; beyond these there are portions of two or three costæ, which are much interrupted by impressions; the surface beyond this is more flattened and is strongly punctured; close to the apex on the margin there is a small frosted golden impression filled with short pale pubescence, and there is a rather larger one a little above it still on the margin. The under side of the insect is æneous, tinted with coppery, with brassy punctuation; the prosternal process is not thickly punctured, it is grooved on each side; the abdomen is strongly marked with elongate punctures; the apical segment is blue, punctured with golden green, and with a narrow frosted margin of green. The reflexed portion of the elytra is shining blue, slightly concave, punctured posteriorly. Legs green.

Length 11 lines.

Hab.—Madagascar.

This species is difficult to locate, but I think it is best placed near *P. zivetta*.

Amphisbeta impressipennis, L. & G., varieties.

1. The typical form of this species, according to a specimen compared with the type by Mr. Edward Saunders. Rather olive-æneous, with three brassy lines on the thorax, with a considerable amount of brassy frosted space on the elytra, especially below the shoulders and on the margin, and always with the sutural interstice brassy. One specimen in the Museum collection has almost the whole of the elytra taken up with the brassy colour.

This form occurs at Antananarivo.

2. Specimens from Fianarantsoa. More brown-æneous in general colour, and are rather smoother.

3. Specimens from Fianarantsoa. Uniform coppery

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brown, smoother than is the case with No. 2, with no brassy lines on the thorax, and with the sutural interstice of the elytra also not brassy; &c.

4. A single specimen from Fianarantsoa resembling No. 3, but with the sides of the thorax much more coarsely punctured, and with no impression within the posterior angle.

5. A single specimen in Mr. Janson's collection, without particular locality, is entirely black above, but in other respects agrees with No. 3.

Hemisobothris parallela, n. sp.

Allied to *H. aureopilosa*, Guérin, but much narrower, more parallel, and with a patch of orange pubescence near the apex of each elytron, &c. Thorax strongly transverse, not quite so much narrowed behind as in *aureopilosa*, bluish black, shining, with the punctures and impressions brassy; the punctuation is strong, but not so close as in *aureopilosa*. The elytra are not broader than the thorax, parallel for three-quarters their length, and then arcuately narrowed to the apex; bronzy-black, shining, with numerous irregular lines of strong punctures, much confused towards the apex, the interstices narrow, irregular, and costiform; the margin at the shoulder is brassy; at one-quarter from the base there is a brassy fascia, not reaching the suture, and a little behind the middle there is a similar fascia; these fasciæ are more or less pubescent; there are also several small brassy, pubescent spots; a little way from the apex there is a large transverse spot, which is filled with orange pubescence. Nearly the whole of the under side of the insect (that is all the punctured portions) is brassy; the prosternal process (which is smooth and almost impunctate) and the middle of the metasternum are dark steel-blue; the abdomen is dark steel-blue, with the whole of the sides of the basal segment and two impressions at the side of each of the other segments frosted and brassy.

Length 12 lines.

Hab.—Antananarivo (Toy).

Laconides æqualis, n. sp.

Allied to *P. aureopilosa*, Guérin, but larger. It agrees in coloration with the general form of *P. aureopilosa*,

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being golden green, tinted here and there with coppery, with blackish marks on the elytra; the under side is entirely bright green, with golden reflections. It differs from *aureopilosa* in having the thorax more coarsely punctured. The elytra are more convex, more attenuated and prolonged at the apex, a little more expanded at the shoulders; without any distinct round pubescent spots. The under flanks of the thorax are very coarsely punctured; the prosternal process is coarsely but not very thickly punctured. The intercoxal process of the abdomen is strongly punctured; the middle of the abdomen is nearly as much punctured as the rest.

Length 20 lines.

Hab.—Madagascar.

This species is clearly allied to *P. obtusa*, Lap. & Gory, but is differently coloured.

Laconides chalybeoventralis, Thomson.

I have hitherto regarded this as a dark variety of *P. aureopilosa*, Guérin, and I think if it be separated as a species it will be necessary to consider the varieties of *P. impressipennis* above noticed as species also.

Phobetodes vespertilio, Thomson.

I have regarded this as a smooth variety of *P. Goryi*; the specimens from Antananarivo and Fianarantsoa recently received are, however, smoother on an average than those formerly received, and for which we have no precise locality.

Enharpya chaotica, Thomson.

The single specimen of this species in the Museum and one in Mr. Janson's collection are females; of *E. amorpha* there is only a single male in the Museum; so that, as M. Thomson does not mention the question of sexes in his description, I shall hold to my opinion that they are sexes of the same species. Great care is required in distinguishing the sexes of these insects.

Carcinias spectralis, Thomson.

I cannot distinguish this from *P. scapularis*, Guérin.

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Carcinias anulifer, n. sp.

Allied to *C. scapularis*, Guérin, but larger, darker, more depressed, and with the subapical yellow patch on the elytra replaced by a streak of white pile. Head and thorax nearly black; the latter of the same form as in *scapularis*, and similarly sculptured, but the depressed portions are not brassy, scarcely tinted with purple. The elytra are black, with slight tints of purple here and there; less compressed below the shoulders, which are consequently less elevated; each elytron has three distinct but obtuse costæ, which do not reach the apex; the interstices are coarsely punctured, or rather wrinkled; there are some small impressed rings, and near the shoulders some impressions which are frosted and of a slight coppery colour, and filled with fine grey pile; the exterior apical portion is smooth. The under side of the insect is chiefly dark green, with dark coppery purple in parts; the prosternal process is smooth, shining, golden green; the metathoracic parapleura are closely and coarsely punctate-rugose. The abdomen is moderately, thickly, and very strongly punctured; there are no distinct white pubescent spots on the 2nd to 4th segments as in *scapularis*.

Length 22 lines.

Hab.—Antananarivo (Toy).

Carcinias cæruleipes, n. sp.

Allied to *P. scenica*, Gory, similarly coloured above, with broader thorax, with the elytra much less attenuated at the apex, and without the fulvous pubescent fascia near the apex; bright golden and green below, with coppery reflections, with blue legs. Thorax much less narrowed in front than in *scenica*, more arcuate at the sides; the sculpture above is somewhat similar, but there are no smooth spots on each side of the disk, as in *scenica*. The elytra are less deflexed at the sides, more parallel, only moderately attenuated at the apex, the shoulders less projecting; the sculpture is very similar; there are numerous small round spots scattered over the surface, those on the middle of each elytron are arranged in two oblique lines; these spots are coppery, and filled with fine whitish pubescence. The under side of the insect is very brilliant; the prosternal process is smooth, green. The metathoracic parapleura have a few obscure

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punctures. The abdomen is obscurely punctured, except the apical segment, which is strongly punctured. The reflexed margin of the elytra is dull blue-black. The tarsi above are green.

Length 20 lines.

Hab.—Madagascar.

Erebodes fulgidiventris, n. sp.

Above coppery brown, the front of the head coppery, some portions of the interstices of the eltyra blackish. Thorax with the surface uneven, distinctly impressed on each side, the impressions and the sides very rugose. Elytra rather smooth, the striæ very imperfect, and not very much impressed; all the surface below the shoulders, a considerable portion of the sides, as well as some oblique, irregular rows of sub-confluent spots, frosted coppery brown, all these spaces filled with soft grey pubescence. All the under surface of the insect bright, shining, purple-tinted coppery, with a little golden green at the margins of the segments; the legs and the reflexed margins of the elytra golden green. Prosternal process almost impunctate.

Length 23 lines.

Hab.—Fianarantsoa (Shaw).

This species differs from *E. Jansonii*, Th., in having the elytra much less strongly striated, in its different colour, &c. From *E. Deyrollei*, Th., it differs in having the thorax impressed on each side, and in being more elongate.

Coccinellopsis ? ? cribraria, n. sp.

Depressed, elliptical, bronzy, the elevated parts æneous. Thorax transverse, moderately narrowed anteriorly, the sides nearly rectilinear; the medial channel is coppery; on each side of this the disk is smooth and shining æneous, and sparingly punctured; the sides are very uneven and rugose. The elytra immediately below the shoulders are rather more than one-third broader than the thorax, subparallel for two-thirds their length, then arcuately attenuated; almost the whole surface frosted and punctured; there are three or four interrupted narrow æneous costæ on the back; numerous small, round impressions are noticeable, particularly on the 2nd and 4th costæ; these spots are finely pilose; at

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the apex the pubescence in the small impressions forms decumbent yellowish tufts. The under side is more shining bronzy than the upper side; the under margin of the elytra and some small irregular smooth spaces at the sides of the abdomen are deep blue; the prosternal process is sparingly punctured; the abdomen is strongly and thickly punctured; the apical segment is nearly semicircular, with the basal line, a medial line, and the margins thickly and finely punctured and brassy, the rest is smooth and dark blue, with a puncture here and there.

Length 13½, breadth 7 lines.

Hab.—Madagascar.

This species stands quite alone; I know of nothing that approaches it, but its somewhat broad form induces me to place it with *Coccinellopsis*, although the abdomen is very different.

Coccinellopsis Lafertei, Gory.

The male of this species differs from the female in having the prosternal process densely and finely punctured and pilose. In the female this process is shining, and has numerous strong punctures scattered over the surface.

None of the immediately allied species known to me differ in this way. But *C. auropicta* and its allies, although far removed in other respects from *C. Lafertei*, agree with it in this difference in the sternal process in the sexes.

Coccinellopsis lateralis, n. sp.

Rather narrow, elliptical. Head and thorax æneous; the latter having the medial channel and punctures brassy. The thorax resembles that of *P. complanata*, but is a little more arcuate at the sides, the surface is very uneven, very rugosely punctured at the sides; on each side of the medial channel there is a small, round, smooth spot, more clearly defined than that in *complanata*. Elytra not very broad and not much expanded at the sides, very convex on the back, with the margins flattened, rather straight at the sides for two-thirds their length, then arcuately narrowed; very strongly punctate-striate, brassy at the suture, passing through brownish coppery to dull purple; the margin dull, dark blue; the apex is truncate but not compressed, brown, the outer angle slightly dentiform. The under side is brassy; the pro-

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sternal process is shining purple and smooth; the irregular smooth spaces at the sides of the abdomen are dark blue; there is some blue colour on the prosternum and flanks of the prothorax, and there is a small blue and purple spot on the episterna. The apical segment of the abdomen is smooth and shining, dark blue at the base, verging into purple and coppery towards the apex; the extreme apex is finely punctured and brassy. The under margin of the elytra is dark blue.

Length 10 lines.

Hab.—Fianarantsoa (Shaw).

Allied to *P. complanata*, but differently coloured and much narrower in the elytra; &c.

Coccinellopsis punctiventris, n. sp.

Resembles *P. lamina*, Klug, in general colour, form, and appearance, but with the elytra more narrowed posteriorly; and with the apical segment of the abdomen thickly and very strongly punctured, with only a small irregular smooth purple space on each side. Thorax æneous, very strongly and not very thickly punctured, the medial channel very narrow in front; on each side of which there are three or four irregular ill-defined impressions, the outer ones as well as most of the punctures brassy. Elytra brassy, with the dorsal, convex, interstices tinted with brown, or coppery; the expanded margin, which is strongly punctured, has a somewhat round concavity some distance from the shoulder, extended inwardly by a brassy, frosted impression; a little behind the middle there are three frosted impressions (on the 2nd and 6th interstices) which are nearly confluent; at some distance from the apex there is a transverse frosted impression, extending from the second interstice to near the margin; the extreme apex is finely punctured and fringed with yellow hair; the external angle is not dentiform. The colour of the insect below is æneous, tinted with brassy, the intercoxal process of the abdomen, some small irregular smooth spaces at the sides of the abdomen, and the posterior part of the under margin of the elytra, tinted with purple. The prosternal process has a slight medial impression; it is very sparingly punctured. ♂.

Length 11 lines.

Hab.—Madagascar.

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Coccinellopsis ovalis, n. sp.

Oval; brownish brassy above and below, with the under margins of the elytra blue-green, some irregular smooth spaces on the sides of the abdomen purple, the anal plate shining coppery purple. It is much narrower than *P. coccinella*, L. & G., and has the elytra with only a very narrow reflexed margin. In the form of the thorax and general coloration it resembles *P. chalcochrysea*, Klug, but the thorax is not margined laterally; the colour and sculpture are the same. The elytra, although much narrower than in *coccinella*, are much shorter and relatively broader than in *chalcochrysea*; the lines of punctures are even stronger than in the latter; there are numerous small round impressions on the alternate interstices, but there are no large lateral impressions; the apex is very slightly truncate, fringed with pale pubescence. The prosternal process is thickly and strongly punctured. The anal plate is nearly round, moderately large, the surface of the segment round it pubescent.

Length 7½ lines.

Hab.—Madagascar.

This species is perhaps best placed near *P. coccinella*.

Coccinellopsis dejecta, n. sp.

Very close to *P. complanata*. It differs in being rather shorter, the thorax less narrowed in front, more rugose at the sides, with the medial channel broader and more defined. The elytra not so gradually narrowed behind; the apex is green and in part very finely punctured, fringed with yellow pubescence. The whole upper side is brownish æneous. The under side is green mixed with purple and tinted with brassy; the smooth spaces at the sides of the abdomen are beautiful purple; the apical abdominal segment is purple, not very brilliant; its basal half is green and finely punctured, leaving the middle part smooth and purple, and in the punctured part on each side there is a small smooth space. The prosternal process is rather thickly and rather finely punctured, much more so than in *complanata* ♂. The under margin of the elytra is beautiful blue, tinted with green on the inner side.

Length 12 lines.

Hab.—Madagascar.

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Coccinellopsis multiguttata, n. sp.

Allied to *P. complanata*, Guérin, but with the thorax less narrowed in front, the elytra straighter at the sides; the apical segment of the abdomen shining purple, with the basal half and a medial line densely punctured and golden. Thorax rather broad, brassy æneous, obliquely narrowed in front of the middle, sparingly but strongly punctured; the medial impression is moderately distinct; there is a small irregular smooth space on each side of the disk, and one on each side of the base; there is a slight impression within each posterior angle. Elytra not so prominent at the shoulders as in *complanata*, more parallel at the sides; dull olive-green, with brassy green margins, punctate-striate, the two or three dorsal striæ strongly impressed; there are numerous small brassy spots on the sutural interstice; about six small quadrate spots on the 3rd interstice, several on the 5th, and about five on the 7th interstice; the apex is brassy, very little compressed, shining, partly frosted, fringed with yellow hair, the external angle not toothed. The under side of the insect is rather dark green, with golden punctures; the middle of the sterna, the intercoxal process of the abdomen, and a smooth irregular-shaped space on each side of the 2nd, 3rd, and 4th abdominal segments, purple. Prosternal process with a few large punctures. The under margin of the elytra dark blue.

Length 12 lines.

Hab.—Madagascar.

Coccinellopsis elliptica, n. sp.

Allied to *P. cassidoides*, Guérin, but narrower and more regularly elliptical, thorax smoother, and with the apical segment of the abdomen finely punctured along the base, closely and very strongly punctured in the middle, smooth on each side. Thorax dull purple-black, even above, the usual medial channel only represented by a small impression at the base; the punctuation is sparse and not very strong; the posterior angles are more closely and finely punctured, and are tinted with brassy. Elytra blue-black, not so much expanded as in *cassidoides;* there are four or five strongly impressed striæ on the back, which are obscurely punctured; the margin near the shoulders is dull green; the extreme base and the suture near the base is brassy; and each elytron has

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three strongly marked transverse, frosted, brassy impressions, somewhat similar to those in *cassidoides*, but extending to the margin. The apex is only slightly compressed, truncate, brassy, and pubescent. The under margins of the elytra are dark blue. The under side of the insect is coppery purple, shining, with the punctures and some frosted impressions on the sides of the abdominal segments brassy. Prosternal process with only a few punctures, but with a longitudinal medial impression extending to the front of the sternum. Femora purple, tibiæ brassy green, tarsi green.

Length 10 lines.

Hab.—Fianarantsoa (Cowan).

Coccinellopsis propinqua, n. sp.

Very close to *C. elliptica*, but differs in being uniform dull black above, slightly shining about the suture of the elytra; the posterior angles of the thorax are not brassy; the elytra have the impressions less marked and smaller; there is no brassy colour at the base. On the under side, the flanks of the thorax, the sternum, and the reflexed margins of the elytra are dark blue; the sides of the metasternum and the middle of the abdomen are more or less brassy, the legs are brassy green. The prosternal process has the same medial impression.

Length 9 lines.

Hab.—Antananarivo (Kingdon).

Coccinellopsis sodalis, n. sp.

Resembles *P. solea*, Klug, but without the oblique impressed line on each side of the thorax; with the shoulder of the elytra rather more square, *i. e.*, less oblique, &c. Thorax dull black, or nearly black; rather sparingly punctured, the punctures strong in the middle, less so on the disk, stronger and more close at the sides, especially at a little distance from the anterior angles, where there is a slight constriction; the medial impression is broad and well marked posteriorly, but is narrow and indistinct in front. The elytra are very broad at the shoulders, only slightly narrower posteriorly till just at the apex, where they are then suddenly narrowed and compressed; dull blue-black, very strongly punctate-striate, the dorsal interstices convex; the basal

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region is more or less æneous, and there are the following brassy impressions:—a large, shallow, ill-defined one on the margin near the shoulders; another similar one a little behind the middle; a third deeper one between the last-mentioned and the apex; and there are four small, round impressions on the 2nd interstice; all these impressions are frosted. The apex is frosted and furnished with yellow pubescence; the outer or lower angle has a strong tooth. The whole under side, including the margin of the elytra, is very dark blue, and is more or less dull; the prosternal process has numerous, large, strong punctures. The abdomen is very strongly and rather thickly punctured, the punctures frequently elongate, those in the intercoxal process particularly so; the apical segment is smooth and shining, with two or three punctures only at the basal angles.

Length 11 lines.

Hab.—Antananarivo (Kingdon).

Coccinellopsis plagiata, n. sp.

Allied to *P. solea*, Klug, but without the oblique brassy impressed line in front of the thorax, and having a large irregular frosted, brassy impression (sometimes filled with yellow tomentum) occupying the whole region of the posterior angle. Thorax very dark blue [sometimes inclined to purple, and sometimes tinted with green at the margins], shining on the disk, sparingly but very strongly punctured, scarcely constricted before the anterior angles; the medial impression narrowed anteriorly, green [or golden] in the middle. Elytra very dark blue, with strongly impressed dorsal striæ; the apex suddenly narrowed and compressed; the apical impression brown and filled with yellow pubescence; each elytron has the following brassy, frosted impressions:—one on the margin below the shoulder, extending towards, but not reaching the suture; an irregular, somewhat broken one about the middle, nearly reaching the suture, but not the margin; a third one some distance from the apex, extending from the margin to near the suture; besides these, there are several small golden spots. The under side of the insect is bright brassy, tinted with pale green, strongly punctured; the sides of the prothorax are dull, pale green; the reflexed margins of the elytra are beautiful green

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[sometimes blue, or inclined to blue posteriorly]; the prosternal process has a few strong punctures, [sometimes with a slight medial impression]; the apical segment of the abdomen is entirely smooth, blue-green. Legs green.

Length 10—11½ lines.

Hab.—Madagascar (Crossley); Fianarantsoa (Cowan).

The remarks in brackets refer to the specimens from Fianarantsoa.

Coccinellopsis bistrigata, n. sp.

Allied to *P. solea*, Klug, but smaller, with a more distinctly defined oblique impressed line on each side of the thorax; the prosternum with a medial longitudinal impression, &c. Thorax subparallel at the sides, suddenly narrowed (or perhaps rather constricted) in front, rather sparingly but strongly punctured; with the medial impression well marked and entire; there is an oblique, rather deeply impressed brassy line extending from the anterior angle to within a short distance of the medial channel; there is also a small impression within each posterior angle. The dorsal striæ of the elytra are very strong, and the first two or three interstices convex; each elytron has the following impressions:—one at the extreme base; one on the margin below the shoulder; one a little behind the middle; and two between this and the apex; these last two rather more approximate than the others, but not running together, as is nearly the case in *P. solea;* there are also four or five small impressions on the 3rd interstice, and some very small dots on the sutural one; the apex is somewhat compressed, frosted, and pubescent, as in *solea*. The colour above, in one specimen, is obscure purple, the other specimens are black; the impressions are slightly brassy, and filled with white pubescence. The under side of the insect is coppery, more obscure and partly brassy at the sides, strongly punctured; the apical segment of the abdomen is smooth, except a narrow basal margin. The under margin of the elytra is dark blue. The legs are brassy.

Length 8—9 lines.

Hab.—Antananarivo (Kingdon).

Coccinellopsis terminalis, n. sp.

Allied to *P. auropicta*, Lap. & Gory, but with the general coloration of *P. complanata*. Brassy, the thorax

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above and the under side of the insect in parts tinted with æneous, the raised interstices of the elytra more brown. Thorax as in *auropicta*, but a little narrower, rather straight at the sides posteriorly, obliquely narrowed in front of the middle; the surface is uneven, moderately and thickly punctured, with a shallow medial impression, and an obscure oblique impressed line on each side in front. The elytra have numerous small round, brassy, frosted spots in lines on the alternate interstices, similar to those in *auropicta;* and there is a large quadrangular frosted space on the margin, some distance from the shoulder, and a similar smaller one some way from the apex; the spaces are not round, as in *auropicta*, and, not being on a black ground, they do not show so distinctly as in *auropicta;* the apex is brown and fringed with yellow hair, the external angle distinctly dentiform. The prosternal process is purple in the middle, and has a medial impressed line, sparingly but strongly punctured. The abdomen has the middle of the intercoxal process and the irregular smooth spaces at the sides of the segments, purple; the apical segment is as if divided into three equal parts by two straight lines, which meet in the middle of the base of the segment, and diverge posteriorly; the middle portion is smooth, shining purple; the lateral portions are thickly punctured, brassy, and pubescent. The under margin of the elytra is dull æneous.

Length 11½ lines.

Hab.—Madagascar.

Coccinellopsis auropicta, Lap. & Gory.

This well-known species in its typical form is rather dull, dark brassy below, with strongly sculptured elytra, with their apex gently prolonged. *C. quadrispilota*, L. & G., I am unable to distinguish from it. Of both these, there are in this Museum specimens compared with the original types by Mr. Edw. Saunders.

C. Schœnherri, Chev., of which the type is in this Museum, is scarcely distinct; it has the same dark brassy coloration below, but the elytra are scarcely as much produced at the apex and the striæ are more obsolete towards the margin.

C. mystica, Thomson, is like *Schœnherri* above, but is more brilliant and green below. One of the Museum

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specimens, however, from Fianarantsoa, approaches *Schœnherri*, even in the colour below.

Mr. Thomson, at the end of his description of *C. mystica*, says:—"Espèce très originale et très facile à reconnaître. Elle est voisine de la *C. auropicta*, Gory." Is this intended as a joke? for with a large series of specimens it is difficult to know where to draw the line between the two, especially as *C. Schœnherri* is intermediate.

Pycnobothris subsilphoides, Thomson.

This species differs from *Coccinellopsis mystica*, Th., in being narrower in form, the elytra not being at all expanded at the sides, and by the black-blue colour of the under side.

Pycnobothris compacta, n. sp.

Closely resembles *P. subsilphoides*, Th., and is of the same form and size. It differs in being more or less tinted above with æneous, in having the elytra more roughly punctured, with the lines of punctures more distinct at the sides. It is the same dark blackish blue below, but the smooth space on the apical segment of the abdomen is more round; this space is shining bronze.

Length 8½—10 lines.

A single specimen, an obscure blackish brown variety, only measures 7 lines.

Hab.—Antananarivo (Kingdon & Toy).

P. ruficauda, Th., is a more elongate species than *P. compacta*, brighter in colour above; is beautiful purple below, at least in part; and has the elytra less rugose, and more regularly striate-punctate.

Hab.—Fianarantsoa (Cowan).

Pycnobothris obscurella, Th.

This species somewhat resembles *P. ruficauda*, Th., but it is very dark brownish black, faintly tinted with æneous, with more rugosely punctured thorax; more strongly sculptured elytra, which are acuminate at the apex and not truncated, and they are rather broader just before the posterior white spots than at their base. The anal plate is shining dark olive, a little elongate, narrowed towards the base, with a fringe of golden

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pubescence round it, which is broad at its base and sides, but very narrow round the apex; the space on each side of this is finely punctured and brassy.

The under flanks of the prothorax are dull æneous, with numerous large, deep punctures.

The prosternal process is sometimes channelled in the middle, sometimes nearly flat, and one example in this Museum has it slightly convex. This difference does not appear to be either sexual or specific. Some specimens have a few punctures in the middle of the process.

Length 8½—11 lines.

Hab.—Antananarivo (Kingdon).

Pycnobothris truncatella, n. sp.

Closely resembles *P. obscurella*, Th., in form and appearance. Obscure coppery brown, with thickly and strongly punctured thorax, and closely and strongly punctate-striate elytra. It is, however, at once distinguished by the elytra being a little truncate at their apex, the outer angle of the truncature slightly dentiform, and by the large lateral spots being round. The under side is almost entirely of an obscure coppery purple in the only example which I have seen. The anal segment resembles that in *obscurella*.

Length 9 lines.

Hab.—Antananarivo (Kingdon).

Pycnobothris cuprifera, Lap. & Gory.

This species is scarcely distinguishable above from *P. obscurella*, Th., but it appears always to want the very small brassy spot on the margin of the elytra, just before the apex, which exists in *obscurella*. Below it is easily separated by the apical segment of the abdomen; this has the anal plate very small, round (or slightly oval), surrounded by a ring of yellow pubescence, which is sunk below the surface of the plate itself; the margin beyond this is impunctate, shining, deep purple, raised, and somewhat thickened; the penultimate segment has its apical margin smooth. The prosternal process is moderately thickly punctured in the middle, longitudinally impressed in the middle. The under flanks of the prothorax are brassy and irregularly, and more finely punctured than in *P. obscurella*.

Length 9—11 lines.

Hab.—Fianarantsoa (Cowan).

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Note:—In a series named by M. Thomson for Mr. Janson, one of the specimens named *P. obscurella* is *P. cuprifera*, and is from Fianarantsoa. It is only from the locality for *obscurella* being given as Antananarivo by M. Thomson that I am able to determine which is the true *obscurella*.

My authority for *P. cuprifera* is a specimen so named from La Ferté's collection, which agrees with Laporte and Gory's description, but as they do not describe the anal plate the determination is not satisfactory.

Pycnobothris crassa, n. sp.

Very near *P. obscurella*, Th., but shorter and broader, with more coarsely punctured elytra, and with brighter colour below. Thorax scarcely narrower than the elytra, closely and very coarsely punctured; brownish coppery, generally with a little æneous and brassy intermixed. Elytra gradually becoming a little wider from the shoulders to about two-thirds their length, then obliquely acuminate, simple at the apex; dark brown tinted with obscure purple, very strongly and closely punctate-striate; with two round spots, filled with pale yellow pubescence, on the margin of each elytron. The under side is shining green [sometimes tinted with coppery], with the sides of the body and margin of the elytra brownish; the apex of the femora, some spaces on the abdomen, and the anal plate are blue. The anal plate is round, or nearly so, relatively larger than in *P. cuprifera*, surrounded by a lightly impressed finely pubescent line; the apical margin is somewhat raised and a little thickened, coppery or purple, obscurely punctured. The prosternal process is longitudinally impressed in the middle, and has numerous strong punctures.

Length 6—8 lines.

Hab.—Antananarivo (Kingdon and Toy).

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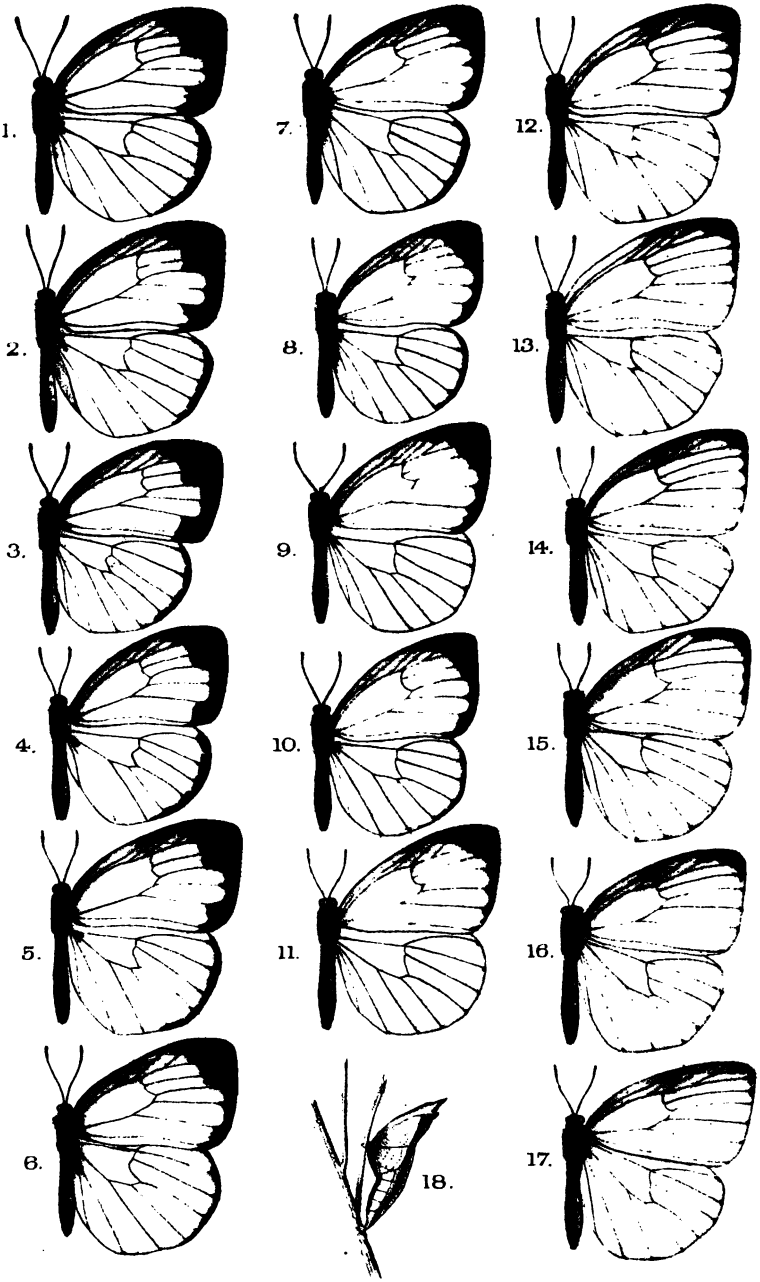

Edwin Wilson. del et lith.

Mintern Bros. imp.

Japanese Terias.

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XV. *Observations upon certain species of the Lepidopterous genus* Terias, *with descriptions of hitherto unnamed forms from Japan.* By Arthur G. Butler, F.L.S., F.Z.S., &c.

[Read October 6th, 1880.]

(Plate VI.)

The difficulty of discriminating between the species of the genus *Terias* has long been admitted by lepidopterists, and many of them have attempted to evade it by regarding the species of this group as extremely liable to variation.

Now, although it cannot be positively proved that the multitudinous similar forms in this genus are constant to their characters, the examination of a long series of individuals from one locality seems to indicate that hybridization, rather than extreme variation, is the factor which produces the apparent gradations from one type to another.

In the group of species allied to *T. hecabe* there are no two more distinct forms than the heavily-bordered type and the species named by M. De L'Orza *T. mandarina;* and it is noteworthy that in the first the female is extremely scarce; in *T. mandarina* this sex is commoner than the male; in colouring also the *T. hecabe* type reminds one of the genus *Colias*, but *T. mandarina* is far more like *Gonepteryx;* yet, with a series of 154 specimens of this section of the genus from Nikko, I have been able to arrange a perfect gradational series of scarcely differing forms from the most heavily-bordered of the Japanese representative of *T. hecabe* to the palest *T. mandarina* in which the border has practically disappeared.

Superficially, therefore, it would seem that these apparently very distinct species were wholly untenable, and that the *T. anemone* of Felder, which stands halfway between their extreme variations, was only one of the gradations which proved them to be identical: this view of the case would commend itself to almost any entomologist who examined merely a selected series of specimens; but when one carefully compares upwards of

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150 specimens, and discovers that the absence of six of them, referable to only two gradations, would at once leave the three species as sharply defined as any in the genus, it naturally occurs to him to examine those six specimens more minutely, and see whether they do not exhibit differences *inter se* which point rather to hybridization than variation for their origin; such I have found to be the case, and, therefore, in the absence of positive evidence of identity founded upon careful breeding, I do not hesitate to regard the *T. hecabe* group, as represented in Japan by three species.

That the species of *Terias* are not necessarily subject to great variation is evidenced by an examination of series of the two other Japanese species, *T. betheseba* and *T. jægeri*; of the first of these I have examined twenty specimens from Nikko, which exhibit no variation whatever; of the second species I have examined thirty-nine specimens, which only vary in the yellower or redder tint on the under surface of the secondaries.

Descriptions of the Japanese forms of the *T. hecabe* group of *Terias*:—

1. *Terias mariesii*, sp. n. Pl. vi. fig. 1.

a. Male only differs from *T. hecabe* in its brilliant lemon-yellow instead of dark gamboge-yellow colouring. In this respect it shows no variation. The female is of a sulphur-yellow colour, and is extremely rare.*

b. Rather larger than the type, the border of the secondaries of about half the width, and emitting short black spurs upon the veins. Fig. 2.

c. The border of the primaries slightly narrower, especially near the external angle, the outer border of the secondaries inconstant, the under surface with the ordinary markings feebly indicated. Fig. 3.

d. Like the type form (*a*) excepting that the black border of the primaries is of little more than half the width at external angle; size very variable. Fig. 4.

e. Similar to the preceding, but with narrower border to the secondaries. Fig. 5.

f. Similar to *e*, excepting that the border of the primaries is distinctly narrower towards the external angle, and the border towards the costa not angulated. Fig. 6.

* Only one female occurred in the collection, and none of *T. anemone*.

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The form which follows this appears to be a hybrid between *T. mariesii* and *T. anemone*, and therefore may be provisionally named. Fig. 7.

Terias hybrida.—The outer border of the primaries rather wider throughout than *T. anemone*, the inner margin exhibiting from eight to nine fairly regular sinuations, of which the two on the median interspaces are broader but scarcely less prominent than the others, the costal margin more or less bordered by a narrow black band; secondaries with the outer border varying from a narrow band to a series of dots; size variable.

2. *Terias anemone.* Fig. 9.

Terias Anemone, Felder, Wien. Ent. Monatschr. vi. p. 23 (1862).

a. Resembles the preceding form, and therefore differs from Felder's type in having a more or less pronounced black border to the secondaries; the border of the primaries is about as wide as in *T. hybrida*, but the sinuation of its inner edge is only strongly defined upon the median interspaces. Figs. 8, 10.

b. Typical *T. anemone*, with slightly narrower border to the primaries than in var. *a*, and dotted margin to the secondaries. Fig. 9.

c. The costal margin of the primaries only slenderly black close to the apical border, and the external border reduced to little more than a sinuated line towards the external angle; secondaries as in preceding form. Fig. 11.

Terias connexiva.—The outer border almost as in var. *c* of *T. anemone*. but the apical portion with an inward angulation, as in the darkest forms of *T. mandarina*; the length of the apical patch variable; in one out of our three examples it is as short as in *T. mandarina*; one of the specimens with the short apical patch has the oblique dash characteristic of *T. mandarina* on the under surface of the primaries; size variable. Fig. 12.

I have little doubt that this is a hybrid between *T. anemone* and *T. mandarina*.

3. *Terias mandarina.* Figs. 16 and 18.

Terias mandarina, De L'Orza, Lep. Jap. p. 18 (1869).

a. Very like the preceding form, but the outer border of the primaries giving place to black marginal dots

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from below the third median branch, the apical portion distinctly angulated internally; the under surface (as in *T. mandarina* generally) almost always with an oblique subapical brown dash on the primaries; females commoner than males. Fig. 13.

b. Apical border of primaries much narrower, not angulated internally; female rather darker than usual; not common. Fig. 14.

c. Apical border still narrower, not sinuated towards the costal margin; female rare. Fig. 15.

d. Typical *T. mandarina*, the apical border greyish and interrupted in both sexes; the external border only represented by dots at the extremities of the veins; female common. Fig. 16.

e. No border at all, but the black marginal dots elongated upon the subcostal branches of the primaries so as to form little oblique costal dashes; female commoner than the male. Fig. 17.

I have thus shown that we now possess a complete gradation of slightly differing forms linking the two most dissimilar types of the *T. hecabe* section of the genus *Terias*, just as in the genus *Euplœa* we possess all the links between the very different-looking *E. dolosa* and *E. violetta*, and in *Teracolus* numerous links, of which more are always coming in, tending to unite the whole of the wonderfully dissimilar forms in that genus; in *Panopea* also and *Neptis*, with many other groups, the intermediates are constantly coming and making the discrimination of species more difficult, and the study of entomology more interesting; in a century from the present time, if collectors labour as assiduously as they have done of late, it will be impossible, I believe, for any entomologist to decide without rearing it from the egg whether any form is a species, a hybrid, or a variety.

So far as I have been able to judge, the *T. hecabe* and *T. mandarina* of China are constant; the intermediate *T. anemone* does not appear to come from that country, in which case hybridization cannot modify the typical forms.

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XVI. *Synopsis of the British* Heterogyna *and* Fossorial Hymenoptera.

By Edward Saunders, F.L.S.

[Read November 3rd, 1880.]

(Plates VII. and VIII.)

It is now about twenty-two years since the late Mr. F. Smith published his descriptive Catalogue of the British Fossorial Hymenoptera, &c., and since that time so many new species have been discovered, and so many alterations have been made in the synonymy of the species then known, that I thought the short treatise, which I now offer to the Society, giving the more modern views of the subject, might not be unacceptable.

In it I have endeavoured to give brief and concise descriptions of each genus and species, accompanied by synoptical tables showing their differential characters in a few sentences.

It is, however, often very difficult to find words which will express the distinctive characters tersely enough for the purposes of such tables, and I hope that, in any cases where the tabulated characters may appear insufficient, the actual descriptions will be consulted, where the differences are pointed out more fully.

The book which has been of more assistance to me than any other in preparing this Synopsis is Thomson's 'Hymenoptera Scandinaviæ;' the aptitude of its author for discovering small structural characters, most of which are really important, although often difficult to find, is truly wonderful, and I have to thank him for many of the characters here employed.

I have omitted a good many species given by F. Smith, which appear to me to have little or no claim to a place in our fauna. Some of these he has himself left out in his Catalogue, published by this Society in 1871.

Altogether I have described 30 species of Heterogyna and 121 species of Fossores. F. Smith, in his last Catalogue, gives 35 species of Heterogyna and 119 of Fossores; but then he places *Mutilla*, *Myrmosa*, and *Methoca* in the Heterogyna, which I have placed in the Fossores. His reason for doing this I have never been able to understand, as the Mutillidæ appear to me to have neither the structure nor the habits of the

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Heterogyna, and certainly, as far as we know, do not possess two forms of the female, as the name Heterogyna implies; except in this case I have altered but very little the general arrangement of the families.

I cannot conclude this without acknowledging how much I owe to the kindness and friendship of the late Mr. Smith; he was always willing to give all the information that he possibly could, and never seemed to mind how often one troubled him. I must also thank Messrs. Bridgman, Cameron, Dale, V. Perkins, Billups, Service, and others for the kind manner in which they have lent me specimens, and helped me with observations, &c.

I hope shortly to publish a similar Synopsis of our British Wasps and Bees.

HYMENOPTERA.

Aculeata.

Hairs simple, or in some cases twisted, but not branched or plumose .. .. *Section* 1.

Hairs more or less branched or plumose, at least those on the thorax .. .. *Section* 2.

I have been obliged to adopt the character of the hairs for my primary division, as I can find no other satisfactory structural character.

Section I.

(2) 1. Petiole of the abdomen with one or more scales or nodes; sexes consisting of ♂, ♀, and ☿ .. *Heterogyna.*

(1) 2. Petiole of the abdomen simple; sexes consisting of ♂ and ♀ only.

(4) 3. Wings not folded longitudinally .. .. .. *Fossores.*

(3) 4. Wings (at rest) folded longitudinally .. .. *Diploptera.*

Heterogyna.

The form of the abdomen in the Heterogyna, or Ants, easily distinguishes them from any other family of the Hymenoptera. The 1st segment in the Formicidæ and Poneridæ and the 1st and 2nd in the Myrmicidæ are narrowed so as to form a distinct petiole, the single joint in the Formicidæ, &c., bearing a transverse upright scale, each of the two joints in the Myrmicidæ forming a distinct elevated node. All the sexes in the Formicidæ are stingless, whereas the ♀ and ☿ of

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the Poneridæ and Myrmicidæ are aculeate. The pupæ of *Formica* and *Ponera* are generally contained in silken cocoons; those of the Myrmicidæ are always naked. All the species possess three sexes, ♂, ♀, and ☿. The ♂ and ♀ have wings; the ☿ is always apterous; the wings of the ♀ are pulled off by the ☿ or cast, after impregnation.

(4) 1. Petiole with a single transverse scale or node.
(3) 2. Abdomen not constricted between the 1st and 2nd segments; ♀ and ☿ without a sting .. *Formicidæ.*
(2) 3. Abdomen constricted between the 1st and 2nd segments; ♀ and ☿ with a sting .. .. *Poneridæ.*
(1) 4. Petiole with two nodes .. .. *Myrmicidæ.*

FORMICIDÆ.

(4) 1. Petiole with an erect scale.
(3) 2. ♂ 1st joint of flagellum not thicker than the rest; ♀ and ☿ with the 1st joint of the flagellum as long as or longer than the apical.. .. .. *Formica.*
(2) 3. ♂ 1st joint of flagellum much thicker than the rest; ♀ and ☿ with the 1st joint of the flagellum shorter than the apical .. .. *Lasius.*
(1) 4. Petiole without an erect scale .. .. .. *Tapinoma.*

Formica, *Linn.* (Pl. VII. figs. 1 and 2).

Syst. Nat. ed. x. vol. i. p. 579.

♂ and ♀ about equal in size; ☿ very variable in this respect, the ☿ major, as it has been called, being often more than half as large again as the ☿ minor. Pupæ enclosed in silken cocoons; ♀ and ☿ without stings. Maxillary palpi with six joints, labial with four. Antennæ 13-jointed in the ♂, 12-jointed in the ♀ and ☿. Mandibles generally somewhat slender in the ♀, wide and triangular in the ♀ and ☿, much narrowed at the base. Upper wings with one marginal, two submarginal, and one discoidal cells, the apical margin of the 2nd submarginal being the actual edge of the wing. Petiole with an erect, flattened scale, generally more or less triangular, widest above.

The species of this genus are rather naturally divided into two sections by their habits, the first four making their nests above ground, the last three underground.

Messrs. Emery and Forel consider the last three to be all races of one species.

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(2)	1. Head more or less emarginate posteriorly	*exsecta.*
(1)	2. Head not emarginate posteriorly.	
(4)	3. Clypeus emarginate	*sanguinea.*
(3)	4. Clypeus not emarginate.	
(8)	5. Frontal area polished..	
(7)	6. Eyes not hairy in ♀ and ☿, sparsely so in ♂, which has the body with only a few scattered hairs	*rufa.*
(6)	7. Eyes hairy in ♀ and ☿, densely so in ♂, which has the body covered with upright hairs	*congerens.*
(5)	8. Frontal area dull.	
(10)	9. Abdomen shining, without a silky pubescence	*gagates.*
(9)	10. Abdomen with a silky pubescence.	
(12)	11. ♂ body without metallic tinge; ♀ body closely punctured; ☿ thorax more or less red	*cunicularia.*
(11)	12. ♂ body with a metallic tinge; ♀ body with scattered punctures; ☿ thorax not reddish at all	*fusca.*

1. *rufa*, Linn. Syst. Nat. ed. x. 1, p. 580, No. 2. Fig. Smith Cat. Brit. Foss. Hym. pl. i. fig. 1, 2, 3, &c.

♂ black-brown; legs and genital segments testaceous; base of femora, tibiæ, and tarsi sometimes darker; head, prothorax and mesothorax, and sides of metathorax, dull; the rest more or less shining. Head and thorax covered with fine semi-erect hairs. Mandibles not toothed; eyes with scattered hairs. Abdomen widest at the base, somewhat egg-shaped, surface very indistinctly and somewhat rugosely punctured, with a few hairs on the basal and apical segments. Wings clouded with brown at the base; nerves brown. Length 10—12 mill.

♀ brown; head, with the exception of the vertex and a central stripe, prothorax, metathorax, and sometimes sides of mesothorax, petiole, and extreme base of abdomen and legs testaceous-red. Head and thorax dull; wings slightly clouded at the base; scutellum and abdomen polished and shining. Eyes not hairy. Apical segment of the abdomen and the under side with somewhat long hairs. Length 10 mill.

☿ entirely dull, except the frontal area and parts of the mouth; head widest behind the eyes; not excavated or constricted posteriorly; red, with a brownish spot covering the vertex, and extending widely between the eyes to the insertion of the antennæ; clypeus not emarginate, with a dark central line; antennæ brown; thorax with only a few scattered bristly hairs, red, more or less clouded on the pro- and mesothorax. Abdomen

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brown-black, covered with a very short, fine, cinereous pubescence, and scattered over with occasional upright silvery hairs, especially on the basal segment; scale of the petiole red, more or less rounded above, and sometimes slightly emarginate; legs reddish. Length 6—10 mill.

Hab.—Common in fir woods, &c., generally forming its dome-like nest on the ground, but occasionally in the trunk of an old tree; the ♂ and ♀ appear about midsummer. In the nest of this ant is found occasionally, another of our rarer species the *Stenamma Westwoodii;* on the Continent, *Diplorhoptrum fugax*, is also found with it.

2. *congerens*, Nyl. Act. Soc. Fenn. (1846), 2, p. 906.

♂ differs from *rufa* in having the eyes more densely and regularly hairy, the wings with pale yellowish nerves at the base, and less clouded; the abdomen dull, and all the segments above with black bristly hairs.

♀ differs in having the eyes with very short, scattered, fine hairs, and the abdomen covered with a very fine short sericeous adpressed grey pubescence. Scutellum dull.

☿ differs in having the thorax comparatively densely covered with hairs, and the eyes hairy.

Hab.—Loch Rannoch and Bournemouth, and probably elsewhere, but overlooked.

Forel and Emery consider this as only a race of *rufa*.

3. *sanguinea*, Ltr. Essai Fourmis France, p. 37.

Resembling *rufa*, but ☿ and ♀ much brighter in colouring.

♂ differs in having the mandibles with three to five teeth, and the clypeus emarginate; the thorax also has only a few isolated bristly hairs. Length 9 mill.

♀ differs in the brightness and extent of the red colour, the thorax sometimes being entirely red, and in having the clypeus emarginate, and the frontal area dull. Length 9—10 mill.

☿ differs much in the same respects as the female; the thorax is generally unspotted, and the legs bright clear testaceous-red; the clypeus emarginate, and the frontal area dull. Some of the pale varieties of *cuni-*

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cularia resemble it closely in colour, and in the dull frontal area, but the simple clypeus will distinguish them at once. Length 5—9 mill.

Hab. — Weybridge, Chobham, Hawley Hants, New Forest, &c. Makes its nest generally in banks, and makes slaves of *F. fusca* and *cunicularia*. The ♂ and ♀ appear about July.

4. *exsecta*, Nyl. Act. Soc. Fenn. 1846, 2, p. 909, Fig. Entom. Ann. 1865, frontisp. fig. 2.

Similar in colour to *rufa* (see No. 1), but very distinct in form; the wide emargination of the head at the back, the smaller eyes placed farther from the posterior margin, and the sides of the head behind the eyes converging to the posterior margin, easily distinguish it in all the sexes, besides the narrow, almost straight-sided and deeply-notched scale of the petiole, and the smaller size of the ♂ and ♀. Length 7—8 mill.

Hab.—Bournemouth.

The ♂ and ♀ appear in July. This species forms a nest, heaped up after the style of that of *rufa* and *congerens*, but much smaller in diameter, and frequently on the open heath.

5. *cunicularia*, Ltr. Hist. Nat. Fourm. p. 151.

Very like *rufa* in colouring; ♂ differs in being smaller, with clearer wings, in having the thorax without semi-erect hairs, and the frontal area dull; the legs clear testaceous. Length 3½ lines.

♀ differs in having the metathorax generally brown, the abdomen dull, the legs clear testaceous, and the frontal area dull. Length 9 mill.

☿ like a small elongate *rufa*, and sometimes even brighter in colour, but generally more obscure. It may always be distinguished from that species by the dull frontal area, and from *sanguinea* by the entire clypeus. Length 7—8 mill.

Hab.—Generally distributed and common in many localities. Makes its nest in the ground; ♂ and ♀ appear about August.

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6. *fusca*, Linn. Syst. Nat. ed. x. 1, p. 580. Fig. Latr. Hist. Nat. Fourm. pl. vi. fig. 32.

♂ dark black-brown, shining, with a somewhat bronzy tint. Scape of the antennæ of the same colour as the head; frontal area dull, legs and genital segments testaceous-red. Length 8 mill.

♀ dark brown, polished, with a bronzy tint, only the legs and scape of the antennæ dull brownish red; head and thorax with a few erect hairs. Abdomen remotely and very shallowly punctured, bearing a few scattered bristly hairs. Length 8 mill.

☿ dark brown, with a bronzy tint, covered with an exceedingly fine sericeous pubescence, which gives it a sheeny appearance; legs and antennæ slightly paler. Abdomen with a few short, pale, bristly hairs near the apex of each segment. Length 5—8 mill.

Hab.—Very common; makes its nest in the ground.

Very closely allied to *cunicularia*, and I have little doubt that Emery and Forel are right in considering them as merely races of the same species; there seems to be no structural character to distinguish one from the other, and their habits are very similar; still they generally differ considerably in colour, but occasionally a ☿ is found which it would be almost impossible to refer to one or the other with any certainty.

7. *gagates*, Ltr. Essai Fourm. France, p. 36.

I have a single ☿ which belongs to this form. Its bright shining, glabrous body, scattered over with brownish bristly hairs, separates it from *fusca*.

Length 7 mill.

Hab.—Bournemouth.

Smith gives this as a new species to England in Ent. Annual for 1866, but has omitted it from his Catalogue. Emery and Forel consider it as another race of *fusca*.

LASIUS, *Fab.*

Syst. Piez. p. 415.

Formica pars, Smith.

Differs from *Formica* in having the ♂ much smaller than the ♀, and in the shape of the antennæ (see table of genera, *antea*).

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(2) 1. Deep black; ♀ and ☿ very shining .. .. *fuliginosa*.
(1) 2. Brownish; ♀ and ☿ not very shining.
(6) 3. Tibiæ with erect prominent hairs.
(5) 4. ♂ with the mandibles with one tooth, wings clear; ♀ head not so wide as thorax, wings clear; ☿ dark brown .. .. *niger*.
(4) 5. ♂ with the mandibles 5-toothed, wings dusky at the base; ♀ head wider than the thorax, wings dusky at the base; ☿ pale yellow .. *umbratus*.
(3) 6. Tibiæ without prominent hairs.
(8) 7. ♂ and ♀ with the wings more or less clouded; ♂ forehead not channelled; ☿ pale yellow .. *flavus*.
(7) 8. ♂ and ♀ wings quite clear; ♂ forehead channelled; ☿ brown .. .. *alienus*.

1. *fuliginosus*, Ltr. Ess. Fourm. France, p. 36. Fig. Hist. Nat. Fourm. pl. v. fig. 27.

Jet-black, shining; head widely excavated behind.

♂ about the same size as the ☿; thorax and abdomen with a few scattered hairs; flagellum of antennæ and the tarsi testaceous; wings dusky at the base. Length 4—5 mill.

♀ and ☿ like the ♂, but rather more shining; the segments of the abdomen above with an apical fringe of fine short hairs, set at some distance from each other; extreme apex of the body, tarsi, and sometimes tibiæ, more or less testaceous. Length, ♀ 6 mill., ☿ 3—5 mill.

Hab.—Generally distributed; in old trees, &c. Very distinct from any other species. ♂ and ♀ are found in June and July.

2. *niger*, Linn. Syst. Nat. ed. x. 1, p. 580.

♂ fuscous, legs and flagellum of antennæ rather paler, entire insect covered with a fine, adpressed, grey pubescence, and with scattered, fine, erect hairs; head slightly narrower than the thorax, deeply sulcate in front; mesothorax, looked at sideways, much raised and rounded in front, flat on the disk; wings hyaline; scutellum large, somewhat raised, and nearly square; scale of the petiole somewhat truncate above, and largely, but very slightly, emarginate; abdomen somewhat egg-shaped; scape of the antennæ and tibiæ with fine erect hairs. Length 3—5 mill.

♂ much larger than the ♀, similar in colour, but with the mandibles, legs, and scape of antennæ pale testaceous-brown; head much narrower than the thorax;

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wings large and hyaline, their nervures pale; abdomen very large and oval, densely covered with a fine silky pubescence, and with short, semi-erect, brownish hairs; scape of the antennæ and tibiæ with fine erect hairs. Length 8—10 mill.

☿ generally rather smaller than the ♂, and like like the ♀ in colour and pubescence, but the head larger and much wider than the thorax; abdomen only slightly larger than the head; scape of the antennæ and tibiæ with fine erect hairs; extreme apex of the antennæ pale in all the sexes. Length 2—5 mill.

Hab.—Very abundant everywhere.

3. *alienus*, Först. Hym. Stud. i. Heft p. 36.

Differing only from the preceding in having the scape of the antennæ and tibiæ without the erect hairs, and being generally rather paler and smaller; ♀ with the costal area infuscate.

Hab.—Not nearly so common as *niger*, but widely distributed. I have taken it at Chobham, Hayling Island, &c.

4. *umbratus*, Nyl. Add. Adn. Form. Bor. Eur. p. 1048.
= *brunnea*, Sm. Cat. Brit. Hym. p. 2.

The ♂ of this species is easily distinguished from either of the above by the much wider head, which is wider than the thorax, by the mandibles being armed with five teeth, and by the dark smoky base to the wings. The flagellum of the antennæ and the tibiæ and tarsi are also paler. Length 3—5 mill.

The ♀ differs from the allied species in its brighter brown, almost mahogany, colour, the large head, which is wider than the thorax, the much smaller abdomen, and the light clear brown antennæ and legs. Length 7 mill.

The ☿ is of a pale yellow colour, and therefore can only be confounded with *L. flavus*, from which the erect hairs of the tibiæ and the denser hairiness of the body generally distinguish it. Length 2—5 mill.

Hab.—Generally distributed, and not uncommon. It occurs in the London district, and I have taken it at Chobham, Hayling Island, &c.

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5. *flavus*, DeGeer. Ins. ii. 1089, 5, pl. xlii. f. 24—28.

♂ differs from the preceding by the narrow head and the untoothed mandibles, and the tibiæ without erect hairs; from *niger* and *alienus* it differs in having no distinct frontal channel, and the wings generally slightly clouded at the base.

♀ differs from *umbratus* in the smaller head, paler colour, and smaller size, and the want of erect hairs on the tibiæ; from *niger* and *alienus* in the dusky base to the wings, the brown colour extending to nearly their middle.

☿ pale yellow, like *umbratus*, but generally smaller, and distinguished by the want of the erect hairs on the tibiæ and scape of the antennæ.

Hab.—Common everywhere.

TAPINOMA, *Foerst.* (Pl. VII. fig. 3).

Hym. Stud. 1 Heft, p. 43.

Differs from either of the preceding genera in wanting the upright scale to the petiole, which is represented by a flattened, somewhat oblong, node.

(2) 1. Black or brown-black .. .. *erratica.*
(1) 2. Rufo-testaceous; ☿ only known .. .. .. *polita.*

1. *erratica*, Latr. Essai Fourm. France, p. 24.

At first sight like a very dark *Lasius niger*, but at once distinguishable by the want of the upright scale to the petiole.

♂ dark black-brown; eyes situated about midway between the base of the head and the apex of the mandibles, vertex square, clypeus deeply emarginate; antennæ very long, three-quarters as long as the body, joints of the flagellum subequal; thorax rounded in front, disk flat; wings hyaline, nervures pale; abdomen with a few scattered bristly hairs above, all the segments with a fringe of hairs beneath; genitalia very large, of the same colour as the rest of the body; tibiæ and tarsi pale, the former clouded in the middle. Length 5—6 mill.

♀ brown-black, with similar pubescence to that of the ☿; abdomen wider than in the male. Length 5—6 mill.

☿ jet-black, covered with very fine adpressed grey hairs; the extreme base of the tibiæ and tarsi

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paler. Very like *L. niger* in shape, but eyes much farther from the base of the head; clypeus deeply emarginate; mandibles with long hairs on their surface; no upright scale to the petiole; surface of the body above without upright hairs; abdomen beneath with long fine hairs on each segment. Length, 3—5 mill.

Hab.—Common only in certain localities, and it seems to confine itself to sandy and dry heathy country. It has occurred at Bournemouth, Chobham, Weybridge, Guildford, Coombe Wood; also near Croydon, and in Scotland.

2. *nitens*, Mayr. Verh. Zool. Bot. Wien. ii. p. 143. = *polita*, Smith, *fide* Emery and Forel.

"☿ rufo-testaceous, smooth and shining; head elongate, with a few scattered long hairs, and slightly emarginate behind; the scape as long as the head; the flagellum about the same length, the two apical joints slightly thickened; thorax narrowed behind, and slightly strangulated between the meso- and metathorax, the latter emarginate behind, with the lateral angles rounded; scale decumbent, rounded above; abdomen ovate, sprinkled with a few long hairs."

Length 4 mill. ☿ only known.

I have never seen Smith's *polita*, so copy the description from his book.

Hab.—Wales; one specimen. J. C. Dale, Esq.

PONERIDÆ.

Ponera, *Latr.* (Pl. VII. fig. 4).

Hist. Nat. Crust. et Ins.

This genus is easily recognised by its elongate parallel-sided shape, and the thick large scale of the petiole, as well as by its short clavate antennæ, which hardly reach to the apex of the metathorax in the ☿, and the constricted 1st segment of the abdomen; maxillary palpi 1- or 2-jointed, labial palpi 2-jointed; wings with one radial cell, two submarginals, and one discoidal.

(2) 1. Paler, puncturation distinct, especially on the head; maxillary palpi 2-jointed, the 2nd terminating in a hair .. .. *contracta.*

(1) 2. Darker, puncturation so fine as to be hardly distinguishable even under a somewhat strong lens; maxillary palpi with only a single joint .. .. *punctatissima.*

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1. *contracta*, Latr. Hist. Nat. Fourm. p. 195, pl. vii. fig. 40.

♂ brown, somewhat shining; head dull, strongly punctured; mandibles testaceous-red; thorax shining, rather remotely punctured; abdomen covered with somewhat decumbent pale hairs; apex of the abdomen paler, with a strong reflexed spine; legs testaceous.

♀ and ☿ of a paler colour, but with the same strong punctuation; the maxillary palpi of two joints, the second ending in a hair; abdomen covered with pale hairs; eyes obsolete in the ☿; wings of the ♀ as in the ♂.

Length 3—4 mill.

Hab.—Rare. Brighton; Merton, Dr. Power; Weybridge, Mr. Billups. I have never taken it myself.

2. *punctatissima*, Rog. Berl. Zeitsch. 1859, p. 246, pl. vii. fig. 7 (palpi). = *tarda*, Sm.

Very like the above, but darker; the punctuation of the head is much finer, so fine indeed as to be hardly discernible, and the pubescence of the abdomen adpressed, not mixed with semi-prominent hairs, as in *contracta*; maxillary palpi 1-jointed.

Length 3—4 mill.

Hab.—Occasionally in houses; native?

MYRMICIDÆ.

(12) 1. Wings not very dark, or if dark not longly ciliated at the edges in ♂; 1st node of petiole much widened behind ♀ and ☿.

(11) 2. Metathorax spined in ♀ and ☿; mesothorax with two impressed lines converging behind in the ♂

(4) 3. Last 3 joints of flagellum not nearly so long as its remainder in ♀ and ☿; apical nerve of submarginal cell in ♂ and ♀ divided in two by a transverse nervure .. .. *Myrmica.*

(3) 4. Last 3 joints of flagellum as long or nearly as long as its remainder in ♀ and ☿; apical nerve of submarginal cell in ♂ not divided by a transverse nervure.

(6) 5. 2nd node of petiole in ♀ and ☿ spined beneath; ♂ with clypeus keeled .. .. *Stenamma.*

(5) 6. 2nd node in ♀ and ☿ simple; clypeus of ♂ not keeled.

(10) 7. Hairs of thorax simple in ♀ and ☿; antennæ 10- or 13-jointed in ♂; if 13-jointed, then with 1st joint of petiole very long.

(9) 8. Eyes very small, and head reticulated behind in ♀ and ☿; ♂ antennæ 13-jointed .. .. *Asemorhoptrum.*

(8) 9. Eyes not very small, and head longitudinally striate behind; ♂ antennæ 10-jointed .. *Tetramorium.*

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(7) 10. Hairs of thorax clubbed in ♀ and ☿; antennæ 12- or 13-jointed in ♂; 1st joint of petiole not elongate .. .. *Leptothorax.*

(2) 11. Metathorax not spined in ♀ and ☿; mesothorax in ♂ without converging lines .. .. .. *Solenopsis.*

(1) 12. Wings very dark and ciliated in ♂; 1st node of petiole square in ☿ and ♀ .. .. .. *Myrmecina.*

Myrmica. (Pl. VII. figs. 5 and 6).

Latreille, Gen. Crust. et Ins. iv. p. 131.

The five forms that I have described of this genus bear a very close general resemblance to one another, and the latest authorities, Messrs. Emery and Forel, consider them as mere races of one species. I have no doubt they are right; but as a rule they are pretty easily distinguishable, and I have therefore thought better to keep them distinct.

The short apical joints to the flagellum, the last three of which are not nearly so long as its remaining joints in the ♀ and ☿, and the transverse nervure which divides the submarginal cell in the ♂ and ♀, distinguish this genus from its allies. Labial palpi 4-jointed; maxillarypalpi 6-jointed.

(6) 1. ♂ with the basal joint of the antennæ half as long as the flagellum, and also gradually curved near the base; ♀ and ☿ with the basal joint not somewhat angularly and sharply bent near the base.

(3) 2. Frontal area longitudinally striated in all the sexes *sulcinodis.*

(2) 3. Frontal area smooth and shining in all the sexes.

(5) 4. ♂ with long erect hairs on the tibiæ; ♀ with the metathoracic spines not longer than they are wide at the base; ☿ with the spines scarcely longer than in the ♀ and the space between them smooth and shining .. .. *lævinodis.*

(4) 5. ♂ with short, somewhat adpressed hairs on the tibiæ; ♀ with metathoracic spines much longer than their basal width; ☿ with long spines like the ♀ and with the space between them rugose *ruginodis.*

(1) 6. ♂ with the basal joint of the antennæ not ½ so long as the flagellum, or, if half as long as the flagellum, then with it sharply bent near the base; ♀ and ☿ with the basal joint sharply and angularly bent near the base.

(8) 7. ♂ basal joint of antennæ very short, not longer than the first two or three joints of the flagellum; ♀ and ☿ with the basal joint not spinose at its bend .. .. *scabrinodis.*

(7) 8. ♂ basal joint of antennæ half as long as the flagellum; sharply bent at the base; ♀ and ☿ with the angle of the basal joint spinosely lobate .. *lobicornis.*

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1. *ruginodis*, Nyl. Adn. Mon. Form. Bor. Eur. p. 929, 2.

♂ dark brown, shining, surface with scattered, short, semi-erect hairs; mesothorax in front, metathorax, and abdomen polished and shining; wings dusky at the base, the dusky colour extending as far as the radial cell; head, across the eyes, wider than the thorax, eyes very prominent, situated about midway between the base of the head and the apex of the mandibles, frontal area not sulcate, vertex somewhat longitudinally rugose; antennæ with the scape curved towards the base, and thickened towards the apex, as long as the first six joints of the flagellum; mesothorax in front of the converging lines very shining and polished, behind them slightly uneven, with indications of longitudinal rugosities; metathorax with two very blunt spines, both nodes of the petiole smooth and shining; abdomen about the same width as the thorax, egg-shaped; legs with fine short semi-adpressed hairs. Length 6 mill.

♀ testaceous, covered with long pale hairs; head, with the exception of the mandibles, abdomen except at the apex, and a curved line running from the insertion of the wings, round the scutellum, generally darker; wings more or less testaceous towards the base, nerves pale; head and thorax deeply and longitudinally rugose, the latter rather smoother on the disk; head wider than the thorax, frontal area smooth and shining, scape of the antennæ slightly and regularly curved at the base; mesothorax rounded in front, moderately convex on the disk, as wide behind as in front; metathorax with two strong, slightly curved spines, which are longer than they are wide at the base, space between them transversely rugose; nodes of the petiole rugose; abdomen shortly oval, with a darker cloud towards the base; legs covered with short, somewhat adpressed hairs. Length 6—7 mill.

☿ differs from the ♀ in the shape of the thorax, which is wider in front than behind, and constricted near the middle; it is also generally much more rugose, with the rugosities deep and longitudinal. The metathorax is as high as the mesothorax, and the spines project above its level. Length 5—6 mill.

A common species in most localities.

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2. *lævinodis*, Nyl. Adn. Mon. Form. Bor. Eur. p. 927.

Extremely like the above, but differs in the male by being smaller, with the antennæ much shorter, and the scape slightly shorter in comparison with the flagellum, and the legs covered with long erect hairs.

In the ♀ by the metathoracic spines being much shorter and wider, each spine being wider at the base than it is long, and quite straight, the space between the spines being smooth and shining, not transversely rugose as in the preceding; the nodes of the petiole also are rather smoother. In the ☿. much as in the ♀, but having, besides, the thorax less deeply rugose, and the rugosities not longitudinal.

Also a common species, but less generally distributed than the preceding.

3. *sulcinodis*, Nyl. Adn. Mon. Form. Bor. Eur. p. 931.

♂ differs from either of the preceding in being darker (nearly black); head not shining, with the frontal area longitudinally sulcate; mesothorax in front dull, more or less tranversely wrinkled, rather deeply and longitudinally rugose behind the converging lines; scutellum and base of the metathorax also rugose; first node of the petiole dull and more or less rugose, second polished and shining; abdomen and legs much as in the preceding. Length 6 mill.

♀ and ☿ may be known by their darker, redder brown colour, the head more deeply rugose, and reticulated behind the eyes at the sides, the scape of the antennæ curved suddenly near the base, the frontal area sulcate, the thorax and nodes of the petiole deeply, longitudinally, and rugosely sulcate. Length 6—7 mill.

Hab.—Rare. Wales, Hampshire, Chobham.

4. *scabrinodis*, Nyl. Adn. Mon. Form. Bor. Eur. p. 930.

♂ at once known from any of the preceding by the short scape of the antennæ, which is not longer than the first two or three joints of the flagellum, and by having the legs very densely covered with long erect hairs.

♀ and ☿ very like *sulcinodis*, but with the scape of the antennæ thicker and rather shorter, distinctly geniculated near the base; it also appears to be flattened at the turn: this appearance is given by a sort

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of angular dilatation on its upper side. The thorax and the nodes of the petiole are less rugose. The colour of the insect is testaceous, as in *ruginodis* and *lævinodis*, from which the geniculated scape distinguish it at once. Wings in the ♀ dusky to beyond the submarginal cell.

Hab.—Very abundant almost everywhere.

5. *lobicornis*, Nyl. Adn. Mon. Form. Bor. Eur. p. 932, fig. Smith Brit. Foss. Hym. pl. i. fig. 12 (antenna).

Like the other species of the genus in general appearance.

♂ differs from *scabrinodis* in the long scape of the antennæ, which is half as long as the flagellum, and from the other species in the scape being angularly bent at the base.

♀ and ☿ are of the same dark colour as *sulcinodis*, but have the scape of the antennæ geniculated as in *scabrinodis*, but not flattened at the bend, the bend bearing a distinct spine.

Hab.—Rare. Chobham, South Shields, Whitley, Scotland, &c.

STENAMMA, *Westw.* (Pl. VII. fig. 7).

Intr. Class. Ins. vol. ii. p. 226.

This genus may be known from *Myrmica* by having only three joints to the labial palpi and four to the maxillary, and by the ☿ and ♀ only having eleven joints to the antennæ. The smooth polished surface of the head and thorax and the spine under the second node of the petiole in the ♀ and ☿, as well as the keeled clypeus of the ♂, will distinguish it from all its allies.

1. *Westwoodii*, Westw. Intr. Class. Ins. ii. p. 226, pl. lxxxvi. fig. 11.

♂ brownish black; antennæ, mandibles, sides of prothorax, and legs pale, slightly hairy; head and thorax dull, and very finely rugose; clypeus with a central keel; abdomen smooth and shining; wings milky white; anterior wings with the marginal cell incomplete, and with one submarginal and one discoidal cell. Length 5 mill.

♀ and ☿ testaceous, smooth, polished, and shining, with short scattered hairs; antennæ rather densely

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clothed with short hairs, basal joint of the flagellum as long as the next three together; metathorax with two rather short, triangular spines, second node of the petiole beneath produced in front into a strong spine; abdomen more or less brown across the middle; wings of ♀ as in ♂, but clearer. Length, ♀ 5 mill., ☿ 3—4 mill.

Hab.—Nests of *Formica rufa*. Weybridge, Guildford, &c.

ASEMORHOPTRUM, *Mayr*.

Europ. Form. (Nachtrag.), after p. 75.

This genus is very closely allied in general appearance to the following, but the ♂ may be known at once by its 13-jointed antennæ; the ♀ and ☿ by their small eyes and 8- to 9-toothed mandibles.

1. *lippula*, Nyl. Add. Alt. Form. Bor. p. 41. Fig. Smith, Brit. Foss. Hym. pl. i. fig. 18.

♂ brown, the antennæ and legs paler, sparsely clothed with long fine pale hairs; head finely and longitudinally rugose; scape of the antennæ as long as the first three joints of the flagellum; wings ciliated, somewhat opaque, nervures very pale; metathorax nearly smooth, with a tooth on each side at the apex; abdomen smooth and shining; first joint of the petiole very long; apex of the abdomen densely covered with somewhat curled whitish hairs. Length 4 mill.

♀ and ☿ reddish brown, mandibles, antennæ, and legs rather paler; head rather elongate and narrow, finely reticulated; thorax irregularly, longitudinally rugose; metathorax with two short spines; first joint of the petiole elongate, with a rather small apical node, second node of the petiole nearly round, a little longer than wide, first segment of abdomen beyond the petiole, very long, at least three times as long as the remainder. Length, ♀ 5—6 mill., ☿ 3 mill.

Hab.—Rare. Plymouth, London district, Chobham, Tunbridge Wells, Norwich, &c.

TETRAMORIUM, *Mayr*.

Form. Austr. p. 151.

Differs from *Myrmica*, &c., as shown in the table of genera.

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Antennæ 10-jointed in the ♂ 12-jointed in ♀ and ☿; labial palpi 3-jointed; maxillary palpi 6-jointed; front wings with one marginal, one submarginal, and one discoidal cell; metathorax with two spines in the ♀ and ☿; merely truncate and angulated in the ♂; ♀ nearly twice the size of the ☿, and considerably larger than the ♂.

1. *cæspitum*, Linn. Syst. Ent. ed. x. vol. i. p. 581.

♂ brown-black, shining; head much narrower than thorax; antennæ and legs paler; head finely and longitudinally rugose on the vertex; thorax shining, clothed with scattered hairs; nodes of the petiole short, the second widely transverse, both more or less hairy above; abdomen polished and shining, with a few scattered pale hairs; wings milky white, nervures pale. Length 6—7 mill.

♀ larger than the ♂; head as wide as thorax, or nearly so; mesothorax irregularly punctured; apex of the metathorax emarginate and spined at each side; abdomen oval, shining and polished, with pale scattered hairs; wings as in the ♂. Length 7—8 mill.

☿ dark brown; thorax, sides of head, antennæ, mandibles, and legs somewhat paler. Head large and quadrate, decidedly wider than the thorax, longitudinally striate; thorax longitudinally striate, much widest in front; metathorax with two sharp spines. Nodes of the petiole much elevated, smooth; first, looked at sideways, almost as high as long; looked at from above, not quite so wide as long; second, looked at sideways, nearly round; looked at from above, transverse. Abdomen shining and polished. Entire insect clothed with scattered long hairs. Length 2—4 mill.

Hab.—Sandy localities; often very abundant.

Leptothorax, *Mayr.*

Form. Austr. p. 159.

This genus consists of three species only in England, which have the peculiarity of having their hairs clavate in the ♀ and ☿, a character easily seen with a strong lens. The ♀ is small, scarcely larger than the ☿; the ♂ is also small, with 11- or 13-jointed antennæ; the frontal area not clearly defined. Labial palpi 3-jointed; maxillary palpi 5-jointed.

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(2) 1. ♂ antennæ 12-jointed; ♀ and ☿ 11-jointed .. *acervorum.*
(1) 2. ♂ antennæ 13-jointed; ♀ and ☿ 12-jointed.
(4) 3. ♂ thorax in front of the converging lines very finely rugose: club of the antennæ in ♀ and ☿ dark .. .. *unifasciatus.*
(3) 4. ♂ thorax in front of the converging lines smooth and polished; club of the antennæ in ♀ and ☿ pale .. .. *Nylanderi.*

1. *acervorum*, Fab. Ent. Syst. ii. p. 358.

♂ black; mandibles and legs brown, joints and tarsi paler; clothed with long whitish hairs, especially on the dull, rugose head; mandibles not toothed; antennæ 12-jointed, scape very short and thick, about as long as the second joint of the flagellum, which is much longer than the first; thorax irregularly rugose posteriorly; metathorax tuberculated at the sides behind; nodes of the petiole smooth and shining; abdomen shining and smooth; wings very thin, milky white. Length 5 mill.

♀ brownish red; head, thorax, and abdomen above, nearly black; mandibles, scape, and legs paler; antennæ 11-jointed, head finely and longitudinally rugose; thorax and nodes of the petiole also rugose; metathorax with two stout, rather blunt spines; abdomen shining, with scattered white hairs; legs with prominent hairs. Length 4—5 mill.

☿ testaceous-red; head, apex of antennæ, and abdomen nearly black; thorax sometimes with a more or less extended dark patch on the disc. Entire insect clothed with scattered short, upright, pale hairs; head and thorax rugose; antennæ 12-jointed; metathorax with two short, rather blunt spines; first joint of the petiole nearly quadrangular looked at from above, from a side view much raised posteriorly; both joints more or less rugose; abdomen smooth and shining. Length 4 mill.

Hab.—Under bark, &c.; chiefly a northern species. I have taken it, however, near Croydon, and it occurs, I believe, in other localities near London.

2. *Nylanderi*, Foerst. Hym. Stud. Form. p. 53.

♂ brown; the mandibles, antennæ, and legs pale; mandibles 4- or 5-toothed; scape of the antennæ as long as the first three or four joints of the flagellum; the first seven joints of the flagellum are of about equal

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lengths, the following four are thicker and longer, and the apical joint is almost longer than the two preceding together; thorax in front of the converging lines smooth and shining, behind finely and longitudinally rugose; metathorax finely rugose, and with two small tubercles; abdomen shining, the nodes of the petiole smooth above. Length 2 mill.

♀ testaceous, club of the antennæ of the same colour; abdomen black-brown, with the base of the first segment widely, and of the following more or less narrowly, testaceous. Head and thorax longitudinally striate, clothed with scattered club-shaped hairs; thorax as wide as the head; wings slightly milky, nervures very pale; metathorax with two sharp spines, very wide at the base; abdomen shining, clothed with scattered hairs. Length 5 mill.

☿ differs from the ♀ only in having the thorax much narrower than the head and constricted in the middle, its surface rather more rugosely striate, and the spines of the metathorax rather longer, and in being smaller in size. Length 2 mill.

Hab.—Not common. I have taken it by sweeping at Chobham and at Wimbledon, but only in solitary specimens. I have compiled the description of the ♂ from Mayr's 'Formicina Austriaca.'

3. *unifasciata*, Ltr. Ess. l'Hist. Nat. Fourm. Fr. p. 47.

Very like the preceding, of which Messrs. Forel and Emery consider it a race, putting them both together under the name *tuberum*, Nyl.

The ♂ may be known from that sex of *Nylanderi* by having the thorax in front of the converging lines rugose; the ♀ and ☿ by having the apex of the antennæ dark dark brown, and the black bands of the body narrower, often wanting, except on the basal segments.

Hab.—Rare. Sherborne, Dorset, C. W. Dale; and Ventnor, Isle of Wight, taken by myself.

Solenopsis, *West.*

Ann. Mag. Nat. Hist. 1840, t. vi. p. 86.

Diplorhoptrum pars, Smith.

This genus may be easily known from any other British one of this group. The ♂ has the mesothorax without

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the impressed converging lines observable in all the others, and the ♀ and ☿ have the metathorax without spines or teeth; the species are very small, the ☿ a good deal smaller than the ♂ and ♀. Labial palpi 2-jointed, maxillary palpi 2-jointed; ♂ antennæ 12-jointed, ♀ and ☿ 10-jointed, club 2-jointed; front wings with one marginal, one submarginal, and one discoidal cell.

1. *fugax*, Ltr. Ess. l'Hist. Fourm. Fr. p. 46. Fig. Smith Brit. Foss. Hym. pl. i. fig. 15, 16.

♂ black, shining; mandibles, antennæ, and legs brown; tarsi and inner margins of the mandibles testaceous. Entire insect covered with long pale hairs; mandibles with three teeth; scape of the antennæ short, about as long as the second joint of the flagellum, but thicker; the three apical joints are longer than the others. Head and thorax finely rugose; abdomen shining, nodes of the petiole finely rugose; wings hyaline, nervures pale. Length 5 mill.

♀ brown-black, shining; mandibles, antennæ, and legs paler. Entire insect hairy, like the ♂; mandibles with four teeth; scape of the antennæ reaching to the eye; the first joint of the flagellum is twice as long as wide, the seven following, shorter than wide, the ninth and tenth forming a decided club. Head and thorax punctured; abdomen shining and punctured, nodes of the petiole somewhat rugose; wings as in the ♂. Length 6 mill.

☿ pale yellow, shining, covered with long pale hairs; clypeus bidentate; mandibles with four teeth; scape of the antennæ not quite so long as the flagellum, but reaching almost to the middle of the apical joint; apical joint almost as long as all the other joints of the flagellum together, apical and penultimate joints forming the club. Head and thorax with scattered punctures; metathorax rounded, without spines; abdomen with scattered punctures; first joint of the petiole very wide behind and rounded, second slightly transverse; legs hairy. Length 2 mill.

Hab.—Southend and Deal, F. Smith.

The habits of this little species, according to Forel (Mitth. Schw. Entom. Gesellsch. vol. iii. No. 3, 1869), are most interesting. It appears often or generally to live

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in the walls of the nests of other ants, so that the two species do not intermix, and, although living in such close proximity to one another, are bitter enemies, and fight ferociously if they meet. The channels cut out by *S. fugax* are so fine that they will only just admit the insect. The long account given by Forel, quoted above, is well worth reading.

Monomorium Pharaonis, *Linn.* Syst. Nat. ed. x. Vol. i. p. 580. = *Diplorhoptrum domesticum*, Sm.

This genus and species can hardly be included amongst our indigenous Hymenoptera, yet it is unfortunately so common now in many houses that I cannot leave it out.

It belongs to the same division as *Solenopsis fugax*, the ♂ having no converging lines on the mesothorax, and the ♀ and ☿ no spines on the metathorax. Its elongate form and almost naked surface at once distinguish it from *fugax*, as well as the short terminal joint to the antennæ, which is not more than half as long as the rest of the flagellum. The ♂ also has 13-jointed antennæ, and the ♀ and ☿ 12; the club composed of three joints.

Common in some houses in London, Hastings, &c.

"A native of tropical and subtropical countries throughout the entire world, living in houses."—Forel and Emery.

Myrmecina, *Curt.* (Pl. VII. fig. 8.)
Brit. Ent. vol. vi. fol. 226.

♂ antennæ 13-jointed, ♀ and ☿ 12-jointed; maxillary palpi 4-jointed, labial palpi 3-jointed; mandibles small in the ♂, with three teeth; those of the ♀ and ☿ with two strong teeth, and seven indistinct small ones; wings very dark and hairy, and margins ciliated, with an appendiculated marginal cell and one submarginal; metathorax spined in all the sexes, but very shortly so in the ♂; first node of the petiole nearly square in all the sexes, second somewhat rounded in front, truncate behind.

1. *Latreillei*, Curt. Brit. Ent. vi. fig. 265 ♂. Smith Brit. Foss. Hym. pl. i. fig. 19, ♀.

♂ black-brown, covered with rather long hairs; antennæ and legs somewhat paler. Head with the vertex

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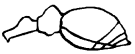
2. Formica.

3. Tapinoma.

1. Formica.

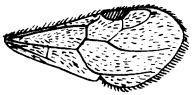
4. Ponera.



5. Myrmica.

6. Myrmica

7. Stenamma.



8 Myrmecina.

9. Mutilla.

10. Myrmosa.

11. Methoca

12. Sapyga.

13. Typhia

14. Aporus.

15. Evagethes.

16. Pompilus.

17. Ceropales.

18. Ammophila.

19. Tachyles.

20 Miscophus.

21. Dinetus.

22. Astata.

23. Spilomena.

24. Stigmus.

25. Dinetus.

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West, Newman & Co. sc.

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much rounded and elevated, the ocelli very prominent; antennæ with the scape very short, about as long as the two following joints; mesothorax irregularly punctured and somewhat rugose behind, converging lines very deep and crenate; metathorax crenate at the base, apex with two short spines; wings as in the description of the genus; abdomen shining and polished; nodes of the petiole irregularly rugose; legs finely pilose. Length 4 mill.

♀ rather larger than the ♂, black-brown, with the clypeus, mandibles, antennæ, legs, and the under side of the thorax and nodes of the petiole reddish testaceous. Head rugose, somewhat clathrately so at the sides; scape of the antennæ thick, and about as long as the nine following joints of flagellum; mesothorax smooth in front, longitudinally rugose behind; metathorax with two horizontal spines; abdomen shining, finely pilose, nodes of the petiole rugose, basal node nearly quadrangular; legs finely pilose. Length 4 mill.

☿ like the ♀ but smaller, and with thorax more rugose. Length 3 mill.

Hab.—Rare. Isle of Wight; London district; Worthing.

The following species have been admitted into our lists, but they only occur in greenhouses, or other places where there can be little or no doubt that they have been introduced from abroad:—

Tetramorium guineense, F. = *Kollari*, Sm. — Greenhouses, Exeter, &c.

T. simillimum, Sm.—Kew, &c.

Pheidole megacephala, F. = *lævigata*, Sm. — Greenhouses, &c., Exeter, and house in the Borough.

FOSSORES.

Of this tribe we have thirty-six genera in England, varying very much in structure and in the neuration of the wings. They have all short tongues, and the ♀ has no pollen-collecting apparatus; the first joint of the posterior tarsi also is not wider than the others, as it is in nearly all the Melliferæ. Still, there are cases where it is not easy, at least for a beginner, to say whether the insect before him belongs to the Fossores

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or the Melliferæ. In such cases I believe the structure of the hairs will prove an unfailing test, the plumose or branched hairs being a character of the Melliferæ only.

FOSSORES.

Division I. — Prothorax considerably produced posteriorly, its hinder angles reaching to the tegulæ of the wings; ♀ sometimes apterous.

Division II.—Prothorax often consisting of little more than a narrow collar, its posterior angles lobately produced, but in no case extending to the tegulæ; ♀ never apterous

Division I.

(4) 1. Eyes sometimes small, sometimes larger and reniform, not touching the base of the mandibles.
(3) 2. Eyes not reniform; ♀ apterous .. .. .. *Mutillidæ.*
(2) 3. Eyes reniform; ♀ winged .. .. *Sapygidæ.*
(1) 4. Eyes large, touching the base of the mandibles.
(6) 5. Intermediate tibiæ with one long spur; intermediate coxæ remote .. .. *Scoliidæ.*
(5) 6. Intermediate tibiæ with two long spurs; intermediate coxæ contiguous .. .. *Pompilidæ.*

MUTILLIDÆ.

(2) 1. Intermediate coxæ distant; ♀ without ocelli .. *Mutilla.*
(1) 2. Intermediate coxæ contiguous; ♀ with ocelli.
(4) 3. ♂ with four submarginal cells; ♀ rugose .. .. *Myrmosa.*
(3) 4. ♂ with three submarginal cells; ♀ smooth and shining- .. .. *Methoca.*

Mutilla, *Linn.* (Pl. VII. fig. 9).

Syst. Nat. ed. x. vol. i. p. 582.

This genus, with its strongly punctured and pubescent species, is not likely to be confounded with any but the genus immediately following, viz., *Myrmosa*, the ♀ of which, in general appearance, greatly resembles the ♀ of *Mutilla;* the presence of ocelli in the *Myrmosa* ♀ will, however, immediately distinguish them. In both our British species the abdomen is banded with pale golden or silvery hairs; the head is small and round, the eyes not reaching the base of the mandibles. Wings of the ♂ with three submarginal cells, the marginal cell short and somewhat semicircular; tegulæ very large; tibiæ of the ♀ denticulate; ♂ winged; ♀ apterous.

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(2) 1. Large, 12—15 mill. long; abdomen in the ♂ steel-blue, with silvery bands; basal segment in the ♀ without a dorsal spot .. .. *Europæa.*

(1) 2. Small, 5—8 mill. long; abdomen in ♂ black, with silvery bands; basal segment in ♀ with a round dorsal spot .. .. *rufipes.*

1. *Europæa*, Linn. Syst. Nat. ed. x. vol. i. p. 583. Fig. Panz. Faun. Germ. 76—20 ♂, Donov. Brit. Ins. pl. 212.

♂ head dark steel-blue, coarsely punctured; prothorax black; mesothorax red, deeply punctured, with the sides black; scutellum and post-scutellum red; metathorax rugose, black, sometimes with the base red; wings fuscous; abdomen hairy, steel-blue, deeply punctured, with a band of pale hairs on the 1st, 2nd, and 3rd segments, those of the 2nd and 3rd slightly interrupted.

♀ head black, rugosely punctured, covered with black hairs; thorax red, quadrangular, rugose; prothorax alone black, surface covered with bristly black hairs; abdomen black, deeply and rugosely punctured, clothed with long bristly black hairs; 1st, 2nd, and 3rd segments with an apical band of golden hairs, that of the 2nd and 3rd interrupted in the middle, that of the 3rd extending almost to the base of the segment; legs densely hairy; tibiæ spinose.

Length 12—15 mill.

Hab.—Sandy lanes, Kent; Darenth and Birch Woods; Hampshire; &c. Often found in the nests of the species of *Bombus*.

2. *rufipes*, Latr. Act. Soc. Hist. Nat. i. p. 9 (1792) = *ephippium*, Fab. Ent. Syst. ii. p. 370, ♂ (1793). Fig. Curtis Brit. Ent. ii. pl. lxxvii.

Largely and deeply punctured, covered with long projecting hairs.

♂ with the head black and very rugosely punctured, with a deep longitudinal incision on the vertex; prothorax, mesothorax, and scutellum red, the first black in its centre; wings slightly dusky; metathorax black, shining, largely and clathrately rugose; abdomen black, shining, largely punctured and clothed with silvery hairs, the 1st and 2nd segments with an apical band of silvery

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hairs; beneath with the 1st and apical segments largely punctured, the others punctured only near the apex; legs black.

Female, head round, black, coarsely punctured; antennæ and mandibles rufo-ferruginous, the former dusky towards the apex; thorax red, rugosely punctured, clothed with a short adpressed silvery pubescence and scattered black, projecting hairs; abdomen black, punctured, clothed with black adpressed hairs and with long scattered projecting pale hairs, basal segment with a round spot on the disk and a band at the apex silvery, 2nd segment entirely covered with silvery hairs; legs red.

Length 5—8 mill.

Common in some localities. Weybridge, Southwold, Hayling Island, Plumstead Common, Charlton, near Greenwich, Deal, Southend, Sandown Bay, &c.

MYRMOSA, *Latr.* (Pl. VII. fig. 10).

Hist. Nat. xiii. p. 266.

There is only one British species in this genus, which is well characterised. ♂ entirely black; wings with four submarginal cells; segments of the abdomen slightly constricted at the base. ♀ much the same shape as that of *Mutilla*, but with distinct ocelli, and the intermediate coxæ contiguous. The surface in both sexes is rugosely punctured and hairy.

1. *melanocephala*, Fab. Ent. Syst. ii. p. 372, ♀. Fig. Latr. Gen. Crust. et Ins. iv. pl. xiii. figs. 6 and 8.

♂ black, rugose, covered with silvery grey hairs; head quadrangular on the vertex, face rounded, broader than long; prothorax truncate in front, mesothorax meeting it in a semicircular line; metathorax bounded at the sides by a slightly-raised line, and channelled in the middle at the base; wings slightly fuscous, with four submarginal cells; 2nd to 6th abdominal segments constricted and depressed at the apex, the depressed portion smooth and shining, 7th segment sulcate, bifid at the apex, 2nd segment beneath with a small spine at the base. Length 6—10 mill.

♀ apterous, covered with short pale hairs; head black, rugosely punctured; antennæ testaceous, dusky towards the apex; thorax testaceous-red, rugose, slightly

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widest in front, sides almost straight; abdomen rugosely punctured, black, with the basal segment, and the base of the second, laterally testaceous-red, each segment at the apex testaceous, with a fringe of pale shining hairs and a few scattered longer hairs on the surface; legs testaceous-red. Length 5—7 mill.

Hab.—Not very common. Littlehampton, Weybridge, Chobham, Hastings, Hampshire, Isle of Wight, Lowestoft, Wakefield, &c. Male on flowers.

METHOCA, *Latr.* (Pl. VII. fig. 11).

Hist. Nat. xiii. p. 268.

♂ elongate, entirely black; antennæ long, reaching to the second segment of the abdomen; wings with three submarginal cells, the first very elongate, and with a slight indication of a divisional nerve on its lower margin, radial cell almost reaching to the apex of the wing; apex of the last ventral segment produced into a strong upcurved spine.

♀ black and red; head large and round; thorax much constricted in the middle; wings wanting; abdomen somewhat egg-shaped, acute at the apex, very shining.

The ♂ might easily be mistaken in the net for a good-sized ichneumon.

1. *ichneumonides*, Latr. Hist. Nat. xiii. p. 269, ♀. Fig. Lep. de St. Farg. Hym. pl. xxxvi. f. 2, ♂. Smith Brit. Foss. Hym. pl. ii. fig. 1 ♀.

♂ black, shining, covered with short greyish white hairs; head very hairy, strongly punctured, rounded posteriorly, clypeus elevated into a sort of angular spine; antennæ with the basal joint very thick, flagellum gradually tapering to the apex; thorax strongly punctured, the puncturation of the mesothorax, &c., denser than that of the prothorax; prothorax truncate in front, sides slightly curved, arcuately emarginate posteriorly; mesothorax sharply truncate posteriorly; scutellum very rugosely punctured, rounded posteriorly, and triangularly raised in the middle; metathorax rounded, gibbous, rugosely punctured; wings hyaline, with three submarginal cells, the third bounded by the apex of the wing; abdomen elongate, 1½ times as long as the thorax,

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shining, with irregular scattered punctures, the 1st four segments depressed and constricted at the apex, apical segment beneath bearing a strong upcurved spine; legs with short grey hairs. Length 12 mill.

♀ apterous, covered with scattered short hairs, shining; head, except the mandibles, and abdomen black; mandibles, thorax, legs, and antennæ testaceous-red; antennæ towards the apex, and front legs, more or less dusky; head nearly twice as wide as the thorax, rounded behind, and convex on the vertex, largely and remotely punctured; mandibles falcate, very pointed, with a single tooth on each before the apex, and with long white hairs on their surface; prothorax convex, much rounded at the sides, emarginate at the base, wider than the mesothorax; metathorax very globose; abdomen petiolated, elongate, ovate, impunctate, testaceous at the apex; tibiæ finely spinose; tarsi obscure at the apex. Length 6—9 mill.

Hab.—In sandy places. Weybridge; Chobham; Black Gang Chine and Sandown, Isle of Wight; Hampstead; Southend; Lyme Regis; Barnes Common; Dr. Power. ♂ very rare; I took one at Chobham in July, 1880, by sweeping in the evening after 8 p.m.

SAPYGIDÆ.

SAPYGA, *Latr.* (Pl. VII. fig. 12).

Prec. Caract. gen. Ins. p. 134.

Easily recognised by the long, somewhat clavate antennæ; the truncate thorax in front, and the smooth cylindrical abdomen, which is slightly widened towards the apex; wings with four submarginal cells.

(2) 1. Antennæ of ♂ gradually thickened to the apex; body in ♀ more or less red .. .. .. 5-*punctata*.

(1) 2. Antennæ of ♂ with their two apical joints strongly incrassate; ♀ without red on body .. .. *clavicornis*.

1. 5-*punctata*, Fab. Sp. Ins. p. 453. Fig. Panz. Faun. Germ. 100, 17, ♂.

Black, punctured; ♂ with the clypeus, two spots on the anterior margin of the prothorax, and a transverse spot on each side of the 2nd, 3rd, 4th, and sometimes 5th, abdominal segments, and a spot at the base of the posterior tibiæ white; antennæ beneath more or less

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red. The number of spots on the abdomen is very variable.

♀ with a small white spot on each side of the prothorax, the abdomen having the 2nd and 3rd segments red, the 4th and 5th each with two lateral white spots, and the 6th with a white spot in the centre. Head and thorax dull, rugosely punctured, clothed with a fine short white pubescence; prothorax sharply truncate in front; wings slightly clouded; abdomen distinctly clavate in the ♂, somewhat oval in the ♀, with the apical segment sharply pointed; surface shining in the ♂, somewhat dull in the ♀, rugosely punctured in both sexes.

Length 9—12 mill.

Hab.—Common in many places. On palings, &c., Wandsworth and London district; Norwich, Yorkshire, Devonshire, Kent, Hants, &c.

2. *clavicornis*, Linn. Syst. Nat. ed. x. vol. i. p. 574 (*Apis*). Fig. Smith Brit. Foss. Hym. pl. ii. fig. 6.

Very like the preceding, but differing in the shape of the antennæ of the ♂, which are longer, and have the two apical joints much thickened, forming a distinct club. The ♀ may be known at once by the colour of the abdomen, which wants the red band of *5-punctata*.

Hab.—Herefordshire, Nottingham, Birmingham, Wakefield, &c. I have never taken it myself.

SCOLIIDÆ.

Tiphia, *Fab.* (Pl. VII. fig. 13).

Syst. Ent. p. 353.

May be known at once by the very elongate thorax, sharply truncate at the anterior margin of the prothorax and the posterior margin of the metathorax; the latter is elongate and nearly square, with three raised dorsal lines; wings with two submarginal cells; tibiæ and tarsi hairy and multispinose.

(2) 1. Larger, radial cell incomplete in ♀; ♂ with the 1st segment of the abdomen transversely carinated at the base .. .. *femorata*.

(1) 2. Smaller, radial cell complete in the ♀; ♂ with the 1st abdominal segment not carinated at the base .. .. *minuta*.

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1. *femorata*, Fabr. Syst. Ent. p. 353. Fig. Panz. Faun. Germ. liii. 2.

Black, shining, clothed with scattered, white, shining hairs; posterior and intermediate femora and tibiæ in the ♀ red. Head rugosely punctured; prothorax slightly emarginate in front, its angles slightly produced, irregularly and remotely punctured anteriorly; mesothorax remotely punctured; wings slightly brownish in the ♀, hyaline in the ♂, ♀ with the radial cell incomplete; scutellum finely and remotely punctured, with a row of large punctures round its posterior margin; metathorax sharply truncate posteriorly, with three raised longitudinal lines down the middle, sides longitudinally strigose; abdomen punctured, 1st segment in the ♂ with a distinct, raised, transverse line at the base; tibiæ and tarsi hairy and spinose.

Length 8—12 mill.

Common in many localities. Birch Wood; Blackwater, Hants; Windsor; Southend; Deal; Lowestoft; Southwold; &c. Often on Umbelliferous flowers, especially *Daucus Carota*.

2. *minuta*, V. d. Lind. Nouv. Mem. Acad. Brux. iv. p. 182. Fig. Curtis Brit. Ent. xiv. p. 664.

Somewhat like the preceding, but much smaller; entirely black in both sexes, and not so shining; the wings with the stigma much larger, and the radial cell in both sexes complete; the ♂ without a raised transverse line at the base of the first abdominal segment.

Length 6—7 mill.

Hab.—Hampstead, Southgate, Colney Hatch, Chobham, Bristol, Glanvilles-Wootton, Braunton Burrows, N. Devon, &c.

POMPILIDÆ.

(4) 1. Front wings with two submarginal cells.
(3) 2. Prothorax elongate; wings received in the middle of the sides of the thorax; mandibles 3-dentate *Aporus*.
(2) 3. Prothorax transverse; wings received before the middle of the thorax; mandibles 2-dentate .. *Evagethes*.
(1) 4. Three or four submarginal cells.
(10) 5. Three submarginal cells.
(7) 6. Vertex not punctured .. .. *Pompilus*.

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(6) 7. Vertex closely and rugosely punctured.
(9) 8. ♂ body and legs entirely black; ♀ with the posterior tibiæ simple .. .. *Agenia.*
(8) 9. ♂ abdomen red at the base, or with the legs more or less red; ♀ with the posterior tibiæ outwardly serrate .. .. *Priocnemis.*
(5) 10. Four submarginal cells .. .. *Ceropales.*

APORUS, *Spin.* (Pl. VII. fig. 14.)

Ins. Lig. ii. p. 5.

A very distinct genus, differing from our other British Pompilidæ in the greater length of the prothorax, which in the ♀ is nearly as long as the mesothorax and scutellum together; it has also, like *Evagethes*, only two submarginal cells in the upper wings.

1. *unicolor*, Spin. Ins. Lig. ii. p. 33 = *bicolor*, Sm. Fig. Smith Brit. Foss. Hym. pl. ii. fig. 11.

♂ entirely black; ♀ with 1st, 2nd, and sometimes base of the 3rd segment of the abdomen red. Entire insect covered with a fine adpressed sericeous pile, changing colour in different lights; prothorax slightly and arcuately emarginate posteriorly, very long, as long as the mesothorax and scutellum together, in the ♀; wings fuscous in the ♀; legs with a few fine spines on the tibiæ.

Length 8—10 mill.

Hab.—Very rare. Southend, two ♀; Pakefield, near Lowestoft, one ♀.—F. Smith.

EVAGETHES. (Pl. VII. fig. 15.)

Differs only from *Pompilus* in having two submarginal cells.

1. *bicolor*, Lep. Enc. Meth. x. p. 183 = *Aporus bicolor*, Shuck.

♂ black, covered with silvery sheeny pubescence, especially on the sides of the thorax, coxæ, and on the metathorax; 1st and 2nd segments of the abdomen generally more or less red; prothorax arcuately emarginate posteriorly, apical ventral segment of abdomen slightly carinated towards the base, 6th emarginate and slightly depressed in the middle, as well as the 5th.

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♀ almost identical with *P. pectinipes*, and, but for the want of the 3rd submarginal cell, I believe undistinguishable from it.

Length 7—9 mill.

Hab.—Chobham, Bournemouth, Weybridge, &c.; rare. Often with *P. pectinipes*, and I feel it hard to believe that the two are more than forms of the same species.

Pompilus, *Fabr.* (Pl. VII. fig. 16.)

Ent. Syst. Suppl. p. 246.

This genus, so closely allied to several of those that follow it, may be at once known by the impunctate surface of the vertex of the head. Although this character, which has been pointed out by Thomson, may seem to some to be scarcely of generic importance, still it affords a simple means of determining the genus, and distinguishes the ♂ from those of the allied genera, wherein the ♀ are otherwise very different; wings with three submarginal cells; posterior tibiæ of the ♀ not serrate.

(8) 1. Abdomen entirely black, or black with white spots.
(3) 2. Abdomen with white spots .. .. .. *rufipes.*
(2) 3. Abdomen without white spots.
(5) 4. Small, legs red in the ♀; posterior tibiæ in the ♂ with a pale spot at the base. Head with a small pale spot on the interior margins of the eyes .. *cinctellus.*
(4) 5. Head and legs entirely black.
(7) 6. ♂ not covered with grey sericeous pubescence; ♀ with the apical segment of the abdomen densely covered with black bristly hairs .. .. *niger.*
(6) 7. ♂ covered with grey sericeous pubescence; ♀ with only a few scattered hairs on the apical segment .. .. *plumbeus.*
(1) 8. Abdomen red at the base.
(12) 9. Metathorax more or less pilose.
(11) 10. Larger, the three red basal segments of the abdomen each with a black apical band .. .. *viaticus.*
(10) 11. Smaller, the basal segments entirely red.. .. *consobrinus.*
(9) 12. Metathorax not pilose.
(22) 13. Prothorax sharply angulated posteriorly.
(17) 14. ♀ with the anterior tarsi simply spined, the spines short; ♂ either with the posterior tibiæ sinuate on the side towards the body and incrassated at the apex, or with the 3rd submarginal cell subquadrate, larger than the 2nd.

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(16) 15. ♂ with the posterior tibiæ sinuate, and incrassated at the apex; both sexes with the 3rd submarginal cell triangular .. .. .. *minutulus.*

(15) 16. ♂ tibiæ simple, 3rd submarginal cell in both sexes subquadrate .. .. *spissus.*

(14) 17. ♀ with the anterior tarsi pectinate; ♂ with the posterior tibiæ simple, and the 3rd submarginal cell triangular.

(19) 18. ♂ with the apical segment of the abdomen with a long pendant spine; ♀ with the apical segment beneath somewhat compressed at the sides and subcarinate .. .. *Wesmaeli.*

(18) 19. ♂ and ♀ with the apical segment simple.

(21) 20. ♂ with the 4th, 5th, and 6th segments beneath longitudinally depressed; ♀ apical segment above covered with bristly black hairs.. .. .. *chalybeatus.*

(20) 21. ♂ with the segments of the abdomen beneath not depressed; ♀ with the apical segment bristly only at the sides .. .. *gibbus.*

(13) 22. Prothorax arcuately emarginate .. .. .. *pectinipes.*

1. *rufipes*, Linn. Syst. Nat. ed. x. vol. i. p. 571. Fig. Curtis Brit. Ent. v. 238.

Black; legs red or black; abdomen with a yellowish white spot on each side at the base of the 2nd, 3rd, and sometimes 4th and 5th segments, and a white spot in the middle of the 6th, the spots on the 3rd often wanting, and I have a specimen with spots on the 2nd, 3rd, and 5th, but wanting those on the 4th segment; wings with a dark apical band. Head, thorax, including the metathorax, and the basal segment of the abdomen, with long hairs; front tarsi in the ♀ with very long spines; prothorax arcuately emarginate posteriorly; abdomen elongate and somewhat acuminate, apical segment in the ♀ beneath carinated, the apex largely rounded, the 6th emarginate; apical segment in ♀ above narrowly rounded, without long hairs.

Length, ♂ 7—10 mill., ♀ 9—15 mill.

Hab.—Ramsdown, Hants; Isle of Wight; Deal; Lowestoft.

2. *cinctellus*, Spin. Ins. Lig. ii. p. 39. Fig. Schiödte Kröy. Tids. i. pl. iv. fig. A.

♀ black, covered with a fine grey silky pubescence; head with a small pale spot on the inner margin of each eye; abdomen with a spot on the apical segment, and posterior tibiæ each with a small white spot at the base, their calcaria very long, almost as long as the basal joint of

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the tarsi; wings hyaline, dusky at the apex, 2nd and 3rd submarginal cells somewhat square, apical segment beneath carinate. Length 4—6 mill.

♀ black, legs red; mandibles, a bilobate spot on the clypeus in front, a spot on each side of the face near the eye, and a spot on each side of the prothorax posteriorly, pale flavous; wings hyaline; front wings with a broad dark band near the apex but not covering it; hind wings with a broad band at the apex; abdomen with a glossy grey pubescence. Length 6—9 mill.

Hab.—On sandy banks. Chobham; Southwold; Devonshire.

3. *niger*, Fab. Syst. Ent. p. 350. Fig. Panz. Faun. Germ. 71, 19.

Entirely black; thorax with a few scattered upright hairs; prothorax angularly emarginate posteriorly; metathorax finely pilose at the sides; wings more or less clouded, with a dark apical band; abdomen with the 2nd and 3rd segments at the base more or less covered with a greyish pubescence; ♀ with the apical segment above covered with long bristly hairs; ♂ with the apical segment of the body beneath compressed and carinated; 3rd submarginal cell generally petiolated.

Length, ♂ 5—7 mill., ♀ 10—12 mill.

Hab.—Hawley, Hants; Undercliff, Isle of Wight.

4. *plumbeus*, Fabr. Mant. i. p. 278 = *pulcher*, Shuck.

♂ black, covered, except on the antennæ and at the base of the abdominal segments, with a silvery grey decumbent pubescence, which gives an ashy grey appearance to the insect; prothorax emarginate posteriorly, but very slightly angulated; wings hyaline; front wings with a dark apical band; abdomen beneath with only the apex of each segment grey, 5th segment beneath entire, not depressed, 6th formed much as in *chalybeatus*. Length 5—7 mill.

♀ differs in having the abdomen wider, and covered with finer grey hairs than the ♂, so that it has a grey appearance only at the apex of each segment. Length 6—9 mill.

Hab.—Common in many places. Southend, Weybridge, Hayling Island, Lowestoft, Southwold, Deal, Dover, Isle of Wight, Exeter, &c.

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5. *viaticus*, Linn. Syst. Nat. ed. x. vol. i. p. 570 = *fuscus*, Smith. Fig. Panz. Faun. Germ. 65, 16.

Black; head and thorax, including the metathorax, with scattered black hairs, thicker and denser in the ♀ than the ♂; abdomen with the first three segments red, apex of the 3rd in the ♂ and of all three in the ♀ black, the 1st and 2nd in the ♂ dusky at the apex.

♂ with the head about as long as wide across the eyes; antennæ about as long as the thorax, the face below them covered with silvery hairs; prothorax very obtusely and angulately emarginate posteriorly; surface of thorax, under a strong power, seen to be finely and longitudinally rugose, covered with a very short grey pubescence, silvery on the metathorax, which has besides some scattered long hairs; wings dusky, with a dark apical band; abdomen elongate, 1½ times as long as the thorax, 7th segment beneath large and subtruncate at the apex, 6th emarginate, with a small round fovea on each side of the emargination; legs spinose.

♀ differs from the ♂ in being much larger, with a shorter, wider body, the basal segment with a narrow straight dark band at the apex, the 2nd and 3rd segments each with a dark band, angularly produced in the centre; 4th, 5th, and 6th segments with black bristly hairs; wings rather darker than in the ♂.

Length 11—15 mill.

Common in sandy places.

6. *consobrinus*, Dbm. Hym. Eur. vol. i. p. 79.

Black, with the first two abdominal segments and the base of the 3rd red.

Much smaller than the preceding; prothorax more sharply and angulately emarginate posteriorly; abdomen without the black bands on the 1st and 2nd segments; apical segment in the ♀ with only a few scattered hairs; the ♂ has the apical segment beneath more pointed and carinated down the middle, the penultimate emarginate and somewhat squarely notched at the apex, depressed in the middle.

Very like the following in appearance, but at once distinguishable by the hairs of the metathorax.

Length 6—8 mill.

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Hab.—Hayling Island; on the sand-hills to the west of the island. Norwich, J. B. Bridgman.

7. *gibbus*, Fab. Syst. Ent. p. 350 = *trivialis*, Dhlb., &c.

♂ black, 1st and 2nd abdominal segments, and sometimes the base of the 3rd, red; head, thorax, and legs covered with a very fine silvery pubescence, which gives them a glossy appearance; face below the antennæ covered with bright silvery hairs; clypeus very slightly emarginate; apex of mandibles red; prothorax angularly emarginate posteriorly; wings with a broad, dusky, apical band, 3rd submarginal cell narrowed at the top; abdomen elongate, 1½ times as long as the thorax, apical segment beneath narrowly rounded at the apex, very convex, 6th notched at the apex, with an impression on each side of the notch, 5th almost entire, not depressed in the middle.

♀, head and thorax with a silvery gloss; apical margin of the clypeus slightly emarginate, slightly raised and margined at the sides, largely and irregularly punctured, with a series of several long setæ above the apical margin; head and prothorax with a few long bristly hairs; abdomen much shorter and wider than in the ♂, apical segment above, and all the segments beneath, with a few long hairs.

Length 7—11 mill.

Common on sandy commons, &c.

8. *chalybeatus*, Schiödte. Kröyer's Nat. Tidskr. i. p. 338, ♂ dark var., = *sericatus*, Shuck. ?

So like *gibbus* that it is only necessary to point out the distinguishing characters.

♂ differs in having the 5th and 6th segments of the body beneath longitudinally depressed, the 4th emarginate, the 5th deeply and squarely notched, and the 6th trilobate, the central lobe slightly emarginate at the apex.

♀ differs in having the clypeus very smooth and shining in front, its margin not raised at the sides, and with only two stiff setæ projecting from above the glabrous margin; the apical segment of the body is much more densely covered with black hairs, and the 3rd submarginal cell is more triangular.

Hab.—Chobham, Southwold, Worthing, &c.

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9. *Wesmaeli*, Thoms. Op. Ent. p. 221. Hym. Scand. iii. p. 149. Fig. Ent. Mo. Mag. xvii. p. 98.

Very like *gibbus*, but easily distinguished by the slightly carinated ventral anal plate of the ♂, which has near its apex a long pendant spine; the ♀ is more difficult to recognise, but has the apical segment beneath somewhat compressed and carinated.

Hab.—Chobham Common; rare.

10. *minutulus*, Dahlbm. Dispos. 1842, p. 10. Fig. Ent. Mo. Mag. xvii. p. 97 = *cellularis*, Thoms.

Black, the two basal segments of the abdomen and the base of the third red; the apex of the 2nd segment in the ♂ more or less fuscous; face below the antennæ, sides of the thorax, the metathorax, and the coxæ, covered with silvery pubescence; prothorax sharply emarginate posteriorly; wings with a broad fuscous apical band, 3rd submarginal cell triangular; ♂ with the posterior tibiæ sinuate on the side towards the body, and incrassated at the apex; ♀ with the anterior tarsi simply spinose, not pectinated as in most of the species.

Closely allied to *spissus*, but differing in the shape of the tibiæ in the ♂, and the triangular 3rd submarginal cell in the ♀.

Length 8—9 mill.

Hab.—Chobham Common.

11. *spissus*, Schiödte. Kröyer's Tidskr. i. p. 336.

♂ differs from *gibbus* ♂ in having the 3rd submarginal cell more quadrate and generally as large or larger than the 2nd; the apex of the wings with a well-defined dark band; abdomen broader and somewhat oval, apical segment beneath compressed and spinosely hairy at the extremity, 6th segment deeply emarginate, the sides of the emargination bisinuate, 5th segment slightly emarginate at the apex. Length 8 mill.

♀ differs from *gibbus*, &c., in having the prothorax destitute of hairs and the anterior tarsi without long spines, as in its allies, but only with short ones like the ♀ of *niger;* wings with a well-defined dark apical band, the 3rd submarginal cell large as in the ♂. Length 9—10 mill.

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Hab. — Glanvilles Wootton, Dorset; Bristol, Yorkshire, &c.

12. *pectinipes*, V. d. Lind. Nouv. Mem. Acad. Brux. iv. p. 351.

Like *gibbus* in colour and size. Head and thorax covered with an extremely fine glossy pubescence, which gives them a silvery appearance in some lights, and in others appears more or less brown; head narrower than in *gibbus*, in proportion to the thorax, and the antennæ shorter and stouter; prothorax arcuately emarginate posteriorly, not angulated; abdomen with the base of the 1st, 2nd, and 3rd segments covered with a sort of glaucous bloom. The ♂ differs in having the prothorax arcuate posteriorly like the ♀, and the apical segment of the abdomen beneath with a central carina uniting at the base with two lateral ones, 6th segment deeply notched, 5th entire.

Length 6—9 mill.

Not a common insect. Chobham, Deal, Southwold, Hampstead, Southend, &c.

I have followed Wesmael and Thomson in my selection of a ♂ for this species. The ♂ assigned to it by Smith is, I have no doubt, the ♂ of *chalybeatus*, and in many respects seems to agree with the ♀ here described, but Wesmael and Thomson have described a ♂ agreeing with *pectinipes* ♀ in having the arcuate posterior margin to the prothorax, and, although I have never seen a British specimen with this character, I have no doubt they are right in their selection; *chalybeatus* ♂ has the posterior margin of the prothorax very distinctly angulated.

The following species are unknown to me, so I quote F. Smith's descriptions:—

1. *acuminatus*, Sm. Cat. Brit. Hym. p. 119.

"♂ (length 4 lines). Black, head very delicately punctured, with a few larger scattered punctures; the face below the antennæ covered with a thin silvery pile, the labrum concealed, the antennæ about the length of the thorax, robust, and of uniform thickness, except the apical joint, which is acuminate; thorax very delicately punctured, the metathorax much more strongly so, and having, particularly at the sides, a silvery pubescence;

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the sides of the thorax and all the coxæ are covered with a changeable silvery pile, and the wings are slightly clouded at their margins; the second submarginal cell is large and oblong, the third becomes gradually about one-third narrower towards the marginal; the legs nigro-piceous, the anterior pair simple, the intermediate and posterior pairs slightly ciliated; abdomen narrower than the thorax, smooth and shining, and thinly covered with a silvery pile, the exterior apex piceous."

Hab.—Kirkpatrick-Juxta, Moffat, Scotland.

2. *approximatus*, Sm. Entom. iv. p. 226.
= *melanarius*, Bold. Ent. Mo. Mag. iv. p. 226.

"Closely resembles *P. niger*, but is a larger insect, its mandibles are entirely black except the extreme apex, which is obscurely rufo-piceous; *P. niger* has three teeth in the mandibles, one large and two small ones; the new species has a single tooth, which is only slightly notched inwardly; the 3rd submarginal cell is quadrilateral and is considerably larger than the 2nd submarginal, and the nervures of the wings are much stronger than in *P. niger;* the latter insect always has the 3rd submarginal either triangular or petiolated; in the ♂ that cell appears to be always petiolated. The distinctions enumerated will serve to distinguish the new species."

Priocnemis.

Schiödte. Kröyer's Tidskr. i. p. 394.

Differs from *Pompilus* in having the vertex distinctly punctured in both sexes, and the posterior tibiæ serrate externally in the ♀. All our British species have the abdomen red at the base, with the exception of the ♂ of *P. hyalinatus*. The ♂ in the various species is easily distinguished by the form of the ventral anal plate, but the ♀ is in some cases very difficult to determine with certainty.

(2) 1. Metathorax pilose .. .. *fuscus.*
(1) 2. Metathorax not pilose.
(4) 3. Wings clear, with a broad well-defined brown apical margin .. .. *affinis.*
(3) 4. Wings without a well-defined apical band.
(14) 5. Wings without a clear well-defined brown spot near the apex in the ♀; abdomen red at the base in both sexes.

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(9) 6. Prothorax posteriorly very deeply and sharply angulated; cubital nervure of front wings in ♂ quite reaching, in ♀ nearly reaching, the apical margin; ventral apical segment in ♀ not carinated.

(8) 7. ♂ legs black, except margin of front tibiæ, ventral apical segment broader; ♀ wings full and long; both sexes with the externo-medial nervure distinctly bisinuate where it crosses the base of the 1st submarginal and 2nd discoidal cells *exaltatus*.

(7) 8. ♂ legs more or less red, ventral apical segment narrower; ♀ wings shorter; both sexes with the externo-medial nervure almost describing a continuous curve .. .. *notatus*.

(6) 9. Prothorax less deeply angulated; cubital nervure in both sexes not nearly reaching the apical margin of the wings; ventral apical segment in ♀ carinated.

(13) 10. ♂ with the sides of the apical ventral segment fimbriated, or with a central pilose carina; ♀ with a clear round white hyaline spot near the apex of the front wings.

(12) 11. ♂ sides of anal segment beneath not fimbriated, apex entire, centre with a pilose carina; ♀ larger than next species, femora and tibiæ more or less red, apex of clypeus shining .. *obtusiventris*.

(11) 12. ♂ sides of anal segment beneath fimbriated with long black hairs, apex deeply notched, centre depressed; ♀ smaller than preceding, legs entirely black, clypeus dull at the apex .. *pusillus*.

(10) 13. ♂ apical segment very narrow, with the sides not fimbriated, and centre without a pilose carina; ♀ without a clear round apical spot to the wings .. .. *parvulus*.

(5) 14. Upper wings in ♀ with a distinct sharply defined brown spot covering the marginal, 2nd and 3rd submarginals, and part of the 3rd discoidal cell; ♂ with the femora more or less red, and the abdomen black .. .. .. *hyalinatus*.

1. *fuscus*, Linn. Faun. Suec. Ed. Alt. p. 412=*sepicola*, Smith. Fig. Panz. Faun. Germ. lxv. 15.

Head and thorax black, with black bristly hairs; metathorax pilose; 1st, 2nd, and 3rd segments of abdomen red, the rest black; legs black; anterior tibiæ in the ♂ testaceous in front.

♂, vertex of head distinctly punctured; prothorax angulately emarginate posteriorly; wings dusky towards the apex, with a transverse stain across the 2nd and 3rd submarginal cells; metathorax evenly rounded, opaque, with very fine erect hairs; abdomen elongate-ovate, somewhat shining, apical segment beneath deeply emarginate, fringed at the sides. Length 12 mill.

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♀ differs in being larger and more robust, with a much wider abdomen, the 4th, 5th, and 6th segments with long bristly hairs above, and all the segments hairy beneath; coxæ and femora hairy; posterior tibiæ serrate. Length 15—18 mill.

2. *affinis*, V. d. Lind. Nouv. Mem. Acad. Brux. iv. p. 237.

Like *fuscus* in colour, but with the front legs entirely black in ♂; ♂ prothorax very sharply angulated posteriorly; metathorax not pilose; wings with a distinct dark apical band, extending to the edge of the 3rd submarginal cell; abdomen rather longer and less shining than in *fuscus*, apical segment beneath widely rounded at the extremity, not emarginate, and fringed, carinated at the base; 6th segment depressed, emarginate at the apex. Length 9 mill.

♀ differs in being stouter and larger, with the posterior margin of the prothorax arcuately emarginate; abdomen covered with a fine white silky pile, apical segment with long black hairs. Length 10—15 mill.

Hab.—Rare. Chobham, Ripley, Weybridge, Southend, Deal, Walmer, and Norfolk.

3. *exaltatus*, Fab. Syst. Ent. p. 351.

♂, head and thorax black, finely punctured; prothorax very deeply emarginate posteriorly; metathorax and sides of the mesothorax more or less silvery; upper wings dusky towards the apex, sometimes with a clearer spot beyond the 3rd submarginal cell; cubital nervure extending to the exterior margin of the wing; abdomen with the 1st and 2nd segments and the base of the 3rd red, the rest black; apical segment beneath largely rounded at the apex, punctured, and pilose; 6th segment smooth and shining at the apex, and slightly emarginate, with an impression on each side bounded by a smooth raised line; legs black, front tibiæ red on their anterior margin; coxæ and femora more or less silvery; inner calcaria of hind tibiæ very long, more than three-fourths as long as the basal joint of the tarsi. Length 9 mill.

♀ differs from the ♂ in being more robust and having the wings dusky at the apex, with a clear round hyaline spot beyond the apex of the 3rd submarginal cell; cubital nervure almost reaching the margin of the

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wing; apical segment of the body pilose, not carinated beneath; front legs entirely black; calcaria pale, much shorter than in ♂. Length 12—15 mill.

Hab.—Littlehampton, Norwich, Lowestoft, Chobham, Hastings, &c., generally common.

4. *notatus*, Rossi. Faun. Etrusc. Mant. i. p. 127.

Extremely like the preceding, but generally smaller. ♂ differs from that of *exaltatus* in having the femora and tibiæ of all the legs more or less ferruginous, the apical segment of the abdomen beneath narrower, and the externo-medial nervure almost describing a continuous curve as it crosses the base of the 1st submarginal and the 2nd discoidal cells. Length 6 mill.

♀ differs from *exaltatus* in being smaller, with shorter wings in proportion; the legs often more or less red; and the neuration of the wings as in the ♂. Length 6—8 mill.

Rare. Highgate, Deal, Ripley, Chobham.

5. *obtusiventris*, Schiödte. Kroyer's Nat. Tidskr. i. p. 329 = *agilis*, Shuck., Smith, &c.

Very like the two preceding, but easily distinguishable by the more obtuse emargination of the base of the prothorax. The ♂ may be further distinguished by the narrow apical ventral segment, which bears a slightly raised, pilose, central carina, and by the shorter calcaria of the posterior tibiæ, which do not extend to three-fourths the length of the basal joint of the tarsi. Length 3 mill.

The ♀ also differs in having the apical segment of the body beneath, with a smooth carina, and the posterior femora at the apex and the tibiæ red. Length 4—5 lines.

Hab.—Erith, Darenth, Harrow, Littlehampton.

6. *pusillus*, Schiödte. Kroyer's Nat. Tidskr. i. p. 327.

Smaller than the preceding; ♂ readily recognised by the emarginate apical ventral segment, which is wide and rounded at the sides, and has its sides fimbriated; the 6th segment is slightly emarginate at the apex, with an impression on each side of the emargination.

♀ differs in the smaller size, and entirely black legs,

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legs, and in having the apex of the clypeus dull, whereas in *obtusiventris* it is shining. The obtuse emargination of the prothorax separates it from *exaltatus* or *notatus*, and also the carinated apical ventral segment.

Hab.—Chobham, and probably in other localities, but I expect overlooked.

7. *parvulus*, Dahlb. Hym. Eur. i. p. 460.

♂ very like the ♂ of the preceding, but rather smaller, and with the apical ventral segment narrow and truncat the apex, the sides not fimbriated, and the centre keeled at the base.

♀ differs from all its allies by having no clear round spot near the apex of the front wings, but has a dusky streak running through the 2nd and 3rd submarginal cells, and a dusky spot in the 3rd discoidal cell. There is also a slight cloud across the base of the 1st submarginal cell; apex of the wings widely clouded.

Hab.—Chobham; Charlwood, Surrey; Scotland.

8. *hyalinatus*, Fab. Ent. Syst. ii. p. 212 = *fasciatellus*, Shuck.

♂ black, head finely and closely punctured; prothorax angularly emarginate behind; mesothorax posteriorly slightly raised down the middle; metathorax evenly rounded, covered with white silvery hairs; wings more or less dusky, darker towards the apex; abdomen elongate, black, basal joint more or less covered with silvery pubescence; legs with the posterior coxæ silvery; femora sometimes entirely black, except the tips of the front pair, sometimes nearly all red, tarsi dusky, first joint of front pair red. Length 3—4 lines.

♀ black with a silvery gloss, two basal segments of abdomen red, apex of the 2nd generally with a black central spot, and the red colour sometimes extending at the sides on to the 3rd segment; head and thorax with erect hairs; prothorax arcuately emarginate posteriorly; metathorax subglobose, smooth, and shining, with scattered erect hairs; wings dusky along the externo and transverso-medial nervures, and with a broad spot covering the marginal, 2nd and 3rd submarginals and part of the 3rd discoidal cell, 3rd submarginal larger than 2nd; 5th segment of abdomen sparsely, and 6th densely

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covered with hairs, posterior tibiæ externally serrate and spined. Length 4—4½ lines.

Hab.—Camberwell, Highgate, Hampstead, Fulham.

AGENIA, *Schiodte.* (Pl. VII. fig. 16).

Kröy. Tidskr. i. p. 321.

Closely allied to *Priocnemis*, but the females with simple tibiæ.

(4) 1. Front wings with a dark band near the apex.
(3) 2. Prothorax angulately emarginate posteriorly; metathorax punctured . .. . *bifasciatus.*
(2) 3. Prothorax arcuately emarginate posteriorly; metathorax transversely rugose.. .. .. .. *variegatus.*
(1) 4. Front wings not banded .. .. *punctum.*

1. *variegata*, Linn. Syst. Nat. ed. x. vol. i. p. 570. Fig. Panz. Faun. Germ. 87, 21.

Black; head and thorax punctured; anterior wings with a narrow band along the transverso-medial and externo-medial nervures, and a wide band covering the radial, 2nd and 3rd submarginals, and part of the 3rd discoidal cell, brown; the extreme apical margin of the wing also of that colour; these bands are only faintly indicated in the ♂; prothorax arcuately emarginate posteriorly; metathorax transversely rugose and punctured; abdomen shining, finely and closely punctured; abdomen in the ♂ somewhat elongate, with the apical segment beneath narrow and carinated, the crest densely covered with long hairs; abdomen in the female shorter and wider, the apex covered with bristly hairs; legs black. Length 7—9 mill.

Rare. Coombe Wood, Wakefield, Yorkshire, &c.

2. *bifasciata*, Fab. Ent. Syst. ii. p. 212. Fig. Panz. Faun. Germ. 86, 11.

Very like the preceding, but with the prothorax angulately emarginate posteriorly, and the metathorax shining and punctured, not transversely rugose; ♂ with the apical segment of the abdomen beneath with an elevated crest, not covered with long hairs, as in *variegata*. Length 7—9 mill.

Rare. New Forest, Colney Hatch, Hampstead, Norwich, Coombe Wood, N. Wales, &c.

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3. *punctum*, Fab. Spec. Ins. p. 448. Fig. Panz. Faun. Germ. 86, 12 = *petiolatus*, Shuck.

Black; ♂ with the sides of the face, mandibles, and a spot on the anal segment, white.

Head and thorax finely and closely punctured; prothorax arcuately emarginate; wings without transverse dark bands; metathorax finely and transversely rugose; abdomen exceedingly finely and closely punctured, and covered with a fine sericeous pubescence; apex with a few irregular hairs; legs with a few very short spines on the tibiæ; ♂ with the apical segment beneath, narrow and somewhat carinated in the middle. Length 7—9 mill.

Hab. — London district, Canterbury, Birch Wood, Bexley, Hammersmith, &c.

CEROPALES, *Latr.* (Pl. VII. fig. 17).

Hist. Nat. xiii. p. 283.

Differs from the rest of the *Pompilidæ* in having the antennæ at some distance above the clypeus, and in having four submarginal cells in the upper wings; both our species have white markings on the thorax and abdomen.

(2) 1. Body not red at the base .. .. *maculatus.*
(1) 2. Body red at the base .. .. *variegatus.*

1. *maculatus*, Fabr. Syst. Ent. p. 345. Fig. Panz. Germ. 72, 9 (*frontalis*).

♂ black; surface of head and thorax very finely rugose, with large shallow scattered punctures; abdomen shining, finely punctured; face beneath the antennæ and along the sides of the eyes, a spot on the 1st and 2nd joints of the antennæ, a semicircular line at the base of the prothorax, the scutellum, the apex of the metathorax on each side, a spot on each side of the 1st, a band at the apex of the 2nd, and a spot on the 5th and 6th, as well as two on the 7th segment of the abdomen, pale yellowish white; legs testaceous-red; femora more or less black; tibiæ dark at the apex; coxæ each with a pale spot; ventral anal segment with its sides widely reflexed.

♀ only differs in being longer, with the face black

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down the centre, almost to the margin of the clypeus; labrum black. Length 7—10 mill.

Hab.—Usually on *Daucus carota*, July and August. Worthing; N. Wales; Penzance; Birch Wood; Erith; Hawley, Hants; Isle of Wight; Yorkshire; Lowestoft.

2. *variegatus*, Fab. Ent. Syst. Suppl. 241, 2, 3. Fig. Smith, Brit. Foss. Hym. pl. ii. fig. 10.

Differs from the preceding in having the labrum white in both sexes, the prothorax posteriorly with only two transverse spots instead of a continuous band, the basal segment and the base of the 2nd segment of the abdomen red; the 2nd segment also with a pale spot on each side at the apex, and the 6th segment with a large round spot in the middle; anterior coxæ pale in front; intermediate and posterior coxæ with a pale spot on the side, near the apex; legs red; apex of posterior femora and tibiæ dark. Length 6—7 lines.

Hab.—Devonshire; Parley Copse, Hants; Weybridge; Chobham; very rare; July and August.

Division II.

Prothorax often consisting of little more than a narrow collar; its posterior angles lobately produced, but in no case extending to the tegulæ; female not apterous.

(13) 1. More than one submarginal cell.
(3) 2. Head and thorax covered with long hairs; abdomen with a long smooth round petiole .. *Sphegidæ*
(2) 3. Head and thorax rarely covered with long hairs; abdomen without a long round petiole; if with a petiole, as in *Pemphredon*, then with the petiole flattened.
(5) 4. Mandibles with a deep incision in their outer margin at some distance from the base, or with the marginal cell appendiculated .. *Larridæ*.
(4) 5. Mandibles with their outer edge single; marginal cell not appendiculated.
(7) 6. Two submarginal cells .. .. *Pemphredonidæ*.
(6) 7. Three or four submarginal cells.
(11) 8. Abdomen not strongly and deeply punctured, except occasionally on the basal segment.
(10) 9. Abdomen black, or black and red, with a distinct petiole .. .. *Mimesidæ*.
(9) 10. Abdomen red and black, not petiolated; or with black and yellow markings; in the latter case sometimes with a petiole .. .. .. *Nyssonidæ*.

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(8) 11. Abdomen striped with black and yellow bands strongly and deeply punctured on all the segments .. .. *Cerceridæ.*
(1) 13. One submarginal cell .. .. *Crabronidæ.*

SPHEGIDÆ.

Ammophila, *Kirby*. (Pl. VII. fig. 18).

Trans. Linn. Soc. iv. p. 195 = *Miscus*, Jur. Hym. i. p. 130.

The long round petiole of the abdomen, which is sometimes composed of the 1st and part of the 2nd segments, is a character by which this genus may be at at once recognised. *Miscus* used to be considered a distinct genus on account of the petiolation of the 3rd submarginal cell; but this is a very variable character, as I have specimens of *Miscus* with the cell simply triangular, and no petiole; this being the case, I have considered it as synonymous with *Ammophila*.

(4) 1. 2nd segment of body, viewed sideways, scarcely widened posteriorly.
(3) 2. 3rd submarginal cell not petiolated; metathorax irregularly rugose .. .. *sabulosa.*
(2) 3. 3rd submarginal cell petiolated; metathorax diagonally rugose in regular lines .. .. .. *campestris.*
(1) 4. 2nd segment of body much widened posteriorly.
(6) 5. Larger and more robust; petiole shorter, with long hairs beneath .. .. *hirsuta.*
(5) 6. Smaller and more slender; petiole longer, naked beneath .. .. *lutaria.*

1. *sabulosa*, Linn. Syst. Nat. ed. x. i. p. 569. Fig. Panz. Faun. Germ. 65, 12.

Black; 2nd, 3rd, and base of 4th abdominal segments, red; spotted with black above in the ♂.

Head and thorax covered with long grey hairs; face in the ♂ with short adpressed silvery hairs; thorax rugosely and shallowly punctured; mesothorax with an impressed dorsal line; metathorax irregularly rugose; 1st segment of the body very long and cylindrical, longer than the 2nd; 2nd, looked at from above, slightly widening to the apex; looked at sideways, nearly equally wide throughout; the remaining segments forming a somewhat regular oval; apical segment in the female with long bristly hairs at the sides; legs black; anterior

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and intermediate tibiæ, and all the tarsi spined in the ♀. Length 18—22 mill.

Common on sandy banks, &c.

2. *campestris*, Ltr. Gen. Crust. & Ins. iv. p. 54. Fig. Curtis, Brit. Ent. xiii. pl. 464.

Differs from the preceding in having the 3rd submarginal cell petiolated (*i. e.*, almost always), and the metathorax finely and regularly transversely rugose, the rugosities in distinct diagonal lines meeting along the centre; the colour of the abdomen in the male generally darker than that of *sabulosa*, and more densely covered with silvery hairs. Length 15—20 mill.

Hab.—Often with the preceding, but generally less common; abundant however near Chobham, Weybridge, &c.

3. *hirsuta*, Scop. Ent. Carn. p. 292, No. 772 = *viatica*, Smith. Fig. Sow. Brit. Misc. i. pl. xxxiii. fig. 1.

♂, head and thorax black; largely and rugosely punctured, densely covered with hairs, which are black on the head and prothorax, and more or less grey on the rest of the body; metathoracic area rugose, not diagonally striate; petiole of the abdomen black, with long hairs beneath, rather longer than the 2nd segment; 2nd, 3rd, and base of the 4th segment red, the rest black; abdomen covered with a very short grey sericeous pubescence, giving it a more or less silvery appearance; 2nd segment much widened posteriorly; legs black; coxæ and femora with long hairs.

♀ differs in being larger and more robust, and in having the head and thorax, &c., densely covered with black hairs. The body also is larger and more shining, being glabrous, without the sericeous pubescence of the ♂. All the tibiæ spinose; posterior tibiæ with a dense silky pubescence on their inner side. Length 15—20 mill.

Hab.—Common in sandy places.

Can only be confounded with the following; it differs from the preceding at once by the shape of the 2nd abdominal segment, which in this species is much widened behind, and by the great hairiness of the head and thorax.

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4. *lutaria*, Fab. Mant. i. p. 273, = *affinis*, Kirb., Shuck., &c.

Differs from the above in having the metathoracic area diagonally and rugosely striate, instead of clathrately rugose; the petiole without the long line of hairs beneath, and the head and thorax less closely punctured; it is also not quite so densely covered with hairs, and has the 2nd abdominal segment black at the base. Length 15—20 mill.

Hab.—Littlehampton, Chobham, Lowestoft, Southend, Deal; August, &c.

LARRIDÆ.

(6) 1. Mandibles with a deep incision in their outer margin.
(3) 2. Three submarginal cells .. .. *Tachytes.*
(2) 3. Two submarginal cells.
(5) 4. The outer one petiolated .. .. *Miscophus.*
(4) 5. The outer one not petiolated.. .. .. .. *Dinetus.*
(1) 6. Mandibles simple .. .. *Astata.*

Tachytes, *Panz.* (Pl. VII. fig. 19).

Krit. Revis. ii. p. 129.

A well-marked genus, and easily recognised. One of our British species, *T. pectinipes*, somewhat resembles a small *Astata*, but the externally dentate mandibles at once distinguish it; anterior wings with three submarginal cells, the 2nd cell receiving both recurrent nervures, the third very long and narrow, and much produced at its lower apical angle; radial cell appendiculated.

(2) 1. Body with the base red .. .. *pectinipes.*
(1) 2. Body entirely black .. .. *unicolor.*

1. *pectinipes*, Linn. Syst. Nat. ed. x. vol. i. p. 570. Fig. Panz. Faun. Germ. 89, 13, and 106, 13, ♀.

Black, 1st and 2nd, and sometimes part of the 3rd, abdominal segments red. Head and thorax very closely and deeply punctured, face below the antennæ and along the sides of the eyes with silvery golden hairs; abdomen finely punctured and covered with exceedingly short grey hairs, which give it a silvery appearance at the sides; apical segment in the ♂ narrowly truncate, and somewhat

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emarginate; in the ♀ acuminate and shining, with a raised line down each side, the surface with large and scattered punctures; tarsi more or less red, front tarsi in ♀ with very long spines; under side of thorax and legs with silvery hairs.

Length 8—10 mill.

Hab.—Sandy places; common.

2. *unicolor*, Panz. Faun. Germ. 106—16.

Very like the preceding, but entirely black, except the reddish ends of the tarsi; both sexes, however, differ in the coarser puncturation of the abdomen; the ♂ has the 7th segment simply rounded at the apex, and in the ♀ the appendix to the radial cell is scarcely visible.

Length 8—9 mill.

Hab.—Chobham, Isle of Wight, Hayling Island, Sandhurst, Weybridge, Deal. Rare.

MISCOPHUS, *Jurine*. (Pl. VII. fig. 20).

Nouv. Meth. Hym. p. 206.

Like a small *Tachytes*, but differing in having only two submarginal cells, the 2nd submarginal cell petiolated, and only receiving the 2nd recurrent nervure.

(2) 1. Head and thorax black; ♀ with abdomen more or less red at the base .. .. *bicolor*.

(1) 2. Head and thorax bronzy black; ♀ with abdomen entirely black .. .. *maritimus*.

1. *bicolor*, Jur. Hym. p. 206. Fig. Smith, Brit. Foss. Hym. pl. iii. fig. 4.

♂ black, sometimes with the basal segment of the abdomen more or less red. Head and thorax closely and evenly punctured, the former with silvery hairs on the face; metathorax longitudinally rugose, with a raised line down the middle; body punctured; metathorax, sides of thorax, and abdomen near the apex of each segment, with silvery hairs; legs silvery on their under sides; wings clouded at the apex.

♀ rather larger than the ♂, with the two basal segments of the abdomen red; the extreme apex of the 2nd black.

Length 6—7 mill.

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Hab.—Chobham, Weybridge, Coombe Wood, Sandhurst, &c.; generally rare, but I have met with it pretty commonly on Chobham Common in July. It is exceedingly active and difficult to catch.

2. *maritimus*, Sm. Brit. Foss. Hym. p. 91.

Differs from the above in the brassy tinge of the head and thorax, the comparatively longer metathorax, and the entirely black abdomen of the ♀.

Hab.—Sand-hills, Deal, F. Smith. I have never seen this species.

DINETUS, *Jur.* (Pl. VII. fig. 21).

Nouv. Meth. Hym. p. 208.

The neuration of the wings, alone, separates this genus off from its allies; the radial cell is short and truncate at its apex, and widely appendiculated; there are only two submarginal cells, neither of which are petiolated, and each of which receives a recurrent nervure.

1. *pictus*, Fabr. Ent. Syst. ii. 299. Fig. Smith Brit. Foss. Hym. pl. iii. fig. 3.

Head black, very closely punctured, with a streak behind each eye and the mandibles in both sexes flavous; the ♂ has, besides, the face and the antennæ of the same colour, the latter organs in this sex curved in a spiral sort of twist, rather above their middle. Thorax black and punctured like the head; collar, tubercles, tegulæ, scutellum, and post-scutellum flavous; metathorax with a wide line of silvery pubescence on each side; abdomen in the ♂ with the first three segments flavous, their apical margins brown, the 4th and 5th brown, with a paler transverse spot at the apex, 6th and 7th testaceous; ♀ with the first three segments testaceous-red, the last three black, the 2nd, 3rd, and 4th each with a small yellow spot on each side at the apical margin, 5th with a pale apical band, and 6th with a large triangular apical spot, extreme apex testaceous-brown; legs flavous, except the posterior femora, in the ♂; ♀ with the femora black, except a white spot at the apex of the 1st and 2nd pairs beneath; tibiæ and tarsi pale, the former black inwardly.

Length 8 mill.

Hab.—Windsor, Ascot. Very rare.

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Astata, *Latr.* (Pl. VII, fig. 22).

Precis. Caract. Gen. Ins.

Eyes in the ♂ touching each other on the vertex; mandibles in both sexes simple externally; front wings with three submarginal cells, the nerve which separates the 1st and 2nd angulated and slightly spurred at the angle, radial cell appendiculated; metathorax elongate, finely clathrate or reticulated. Both our British species are found in sandy places, and seem to enjoy the hottest sunshine they can find, basking on the sand. They are very wary and difficult to approach.

(2) 1. Larger, ♂ with the forehead unspotted; ♀ with the thorax strongly punctured; metathorax in both sexes regularly clathrate .. .. *boops.*

(1) 2. Smaller, ♂ with a yellow transverse spot on the forehead; ♀ with the thorax scarcely punctured; metathorax in both sexes very finely reticulated *stigma.*

1. *boops*, Schr. Ins. Austr. 384. Fig. Smith Foss. Hym. pl. iii. fig. 5.

Black, shining, three basal segments of the abdomen more or less red.

♂ face covered with silvery hairs; eyes touching each other on the vertex; head behind the eyes, prothorax, mesothorax in front, and metathorax at its base and round the sides, basal segment of the abdomen above and all the segments beneath, with long hairs; thorax somewhat finely punctured; scutellum smooth and shining, with a central line, and a few large punctures; metathorax finely and regularly clathrate; body extremely finely reticulated, with a few scattered punctures; legs black; posterior tibiæ inwardly covered with velvety pubescence.

♀ differs in having the eyes remote on the vertex, the thorax and head more shining, with larger scattered punctures.

The wings in both sexes more or less brown near the apex.

Length 10—12 mill.

Hab.—Hampstead, Coombe Wood, Hawley Hants, Isle of Wight, Reigate, Chobham, Hayling Island, near Lowestoft, and Southwold; in sandy places.

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2. *stigma*, Panz. Faun. Germ. 107, 13.

Smaller than *boops*. The ♂ has a double, transverse cream-coloured spot just above the insertion of the antennæ; the thorax is dull and shallowly punctured; the metathorax is so finely reticulated that it only presents a dull appearance, except under a strong power, and differs in this very notably from *boops*, where the reticulation is large and very distinct.

The ♀ differs in having the thorax smooth, with only a very few large scattered punctures.

Length 7—8 mill.

Hab.—Weybridge, Deal, Chobham, Littlehampton, N. Wales.

Very rare, and the ♂ very difficult to catch; it sits down in the bright sun on the most exposed sandy places, and is generally off before a net can be got over it. I have only taken two males, both at Chobham in June, but neither males nor females appear to come out except on the hottest days.

PEMPHREDONIDÆ.

(4)	1. One recurrent nervure.	
(3)	2. Anastomising with 1st transverse cubital nervure	*Spilomena.*
(2)	3. Joining the cubital nervure about the middle of the 1st submarginal cell	*Stigmus.*
(1)	4. Two recurrent nervures.	
(8)	5. Head and thorax without long pilose hairs.	
(7)	6. Labrum triangular, notched at the apex ..	*Diodontus.*
(6)	7. Labrum produced into a simple point at the apex	*Passalœcus.*
(5)	8. Head and thorax covered more or less sparsely with long pilose hairs.	
(10)	9. Face simple between the antennæ	*Pemphredon.*
(9)	10. Face between the antennæ with a blunt tubercle or spine	*Ceratophorus.*

Spilomena, *Shuck.* (Pl. VII. fig. 23).

Trans. Ent. Soc. ii. p. 79 = *Celia*, Shuck. Brit. Foss. Hym. p. 182.

This and the following genus are remarkable for the very large stigma of the anterior wings, and are amongst the smallest of our Aculeates. *Spilomena* has two submarginal cells, the 2nd somewhat diamond-shaped, the recurrent nervure joining the 1st transverse cubital nervure. Abdomen nearly sessile.

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1. *troglodytes*, V. de Lind. Nouv. Mem. Acad. Brux. v. p. 76.

♂ black; legs, antennæ, clypeus, mandibles, a spot on each side of the face, and the tegulæ, yellow; head and thorax dull, finely and closely punctured; metathorax transversely rugose, sharply truncate posteriorly, its sides and apical margin slightly raised, its disk with two longitudinal raised lines; wings with the stigma very large and semicircular; abdomen bright and shining.

♀ differs in having the clypeus black, the face unspotted, and the antennæ and mandibles piceous; the legs and tegulæ also piceous; the femora nearly black.

Length 2½—3 mill.

Hab.—London district; Charlton, Kent, burrowing in hard white sand, F. Smith; Charlwood, Surrey, &c.

STIGMUS, *Jurine*. (Pl. VII. fig. 24).

Nouv. Meth. Hym. p. 139, pl. iii.

Like the preceding genus in most of its characters, but differs in having the abdomen petiolated, and the recurrent nervure received in the middle of the 2nd submarginal cell.

1. *pendulus*, Panz. Faun. Germ. 86, 7.

♂ and ♀ black; antennæ, mandibles, tegulæ, anterior and intermediate tibiæ and base and apex of posterior tibiæ, all the tarsi, and the extreme apex of the femora, pale testaceous. Head rather wider than the thorax, vertex nearly square in the ♀; clypeus and face below the antennæ, covered with silvery hairs in the ♂, the apical margin of the former in the ♂ simple, in the ♀ deeply notched; prothorax longitudinally sulcate, with its angles prominent; mesothorax in front with two raised smooth longitudinal lines, its surface exceedingly finely and longitudinally striate (this can only be seen under a very strong lens), its lateral margins reflexed, the division between the mesothorax and scutellum crenate, as also, the lateral reflexion; metathorax largely and clathrately rugose, with a raised central longitudinal line and two others on each side of it, the inner ones of which are divided into two at the base; wings with the stigma

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very large and more elongate than in *Spilomena*; abdomen shining, its petiole rugose and longitudinally sulcate.

Length 5—6 mill.

Hab.—London district, Tunbridge Wells, Chobham (bred from pierced stems of brambles), &c.

Diodontus, *Curt.* (Pl. VII. fig. 25).

Brit. Ent. ii. 496.

Labrum produced and emarginate at the apex; anterior wings with two submarginal cells, each receiving a recurrent nervure, the 2nd cell longer than wide; abdomen with a short, wide petiole; posterior tibiæ more or less spinose.

(2) 1. Mandibles yellow .. .. *minutus.*
(1) 2. Mandibles black.
(4) 3. Thorax finely and closely punctured; division between the scutellum and thorax consute .. *tristis.*
(3) 4. Thorax with scattered punctures; division between the scutellum and thorax simple .. .. *luperus.*

1. *minutus*, Fab. Ent. Syst. ii. p. 302.

♂ and ♀ black; mandibles, tegulæ, tubercles, extreme apex of the femora, the base of the tibiæ, and the whole of the anterior tibiæ and tarsi, except a narrow streak at the back of the former, pale yellowish or testaceous; the ♂ has the under side of the antennæ and the intermediate and posterior tarsi also pale. All the markings in the ♂ are brighter and paler than in the ♀. Head finely and deeply punctured, surface very finely rugose; mandibles with long hairs on their outer margin; clypeus bidentate; ♂ with the face below the antennæ covered with shining silvery hairs; thorax not so wide as the head, shallowly and irregularly punctured, surface like that of the head; division between the mesothorax and scutellum simple; metathorax largely rugose, somewhat clathrate at the base, more or less hairy at the sides; abdomen finely punctured, and covered with very short grey hairs; apical segment in the ♀ much more largely and strongly punctured than the rest, its sides carinated; 6th segment in the ♂ with a series of bristly hairs on its apical margin;

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tibiæ irregularly denticulate in the ♀, in the ♂ with spinose hairs.

Length 4—6 mill.

Common, generally in sandy banks, &c.

2. *luperus*, Shuck. Foss. Hym. p. 186.

Differs from the above in the ♂ by having the mandibles black, with only the apex reddish, the antennæ entirely black, and the head and thorax more strongly punctured.

♀ differs from *minutus* in the black mandibles and the dark tegulæ and tubercles, the rather more shining thorax, the much more sparsely punctured 2nd segment of the abdomen, the more acute apical segment, and the almost black legs.

Length 5—7 mill.

Hab.—Widely distributed; Southwold, near Reigate, Hayling Island, &c.

3. *tristis*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 78.

Larger than either of the preceding, and differing in having the division between the mesothorax and the scutellum consute. The head and thorax in the ♂ are closely and rugosely punctured; the tegulæ in front and the tubercles pale; metathorax very rugose, pilose at the sides; abdomen finely punctured, and with a scattered short grey pubescence; anterior tibiæ in front, the tarsi and the base of all the tibiæ, pale yellow.

♀ almost as large as *Cemonus unicolor*, entirely black, except the calcaria, and sometimes a piceous spot at the base of the tibiæ, and the basal joints of the tarsi, which are generally more or less piceous; head rather strongly punctured; thorax with scattered punctures and very irregular longitudinal striæ; the division between the mesothorax and scutellum very strongly consute; abdomen very finely punctured, and with short grey hairs, apical segment strongly and largely punctured, and occasionally somewhat piceous.

Length 6—8 mill.

Hab.—Common generally.

PASSALŒCUS, *Shuck.* (Pl. VIII. fig. 26).

Foss. Hymen. p. 188.

This genus resembles *Diodontus* in general appearance, but has the abdomen more elongate and cylindrical, the

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26. Passalœcus.

27. Pemphredon

28. Ceratophorus.

29. Mimesa.

30. Psen

31. Harpactus.

32. Didineis

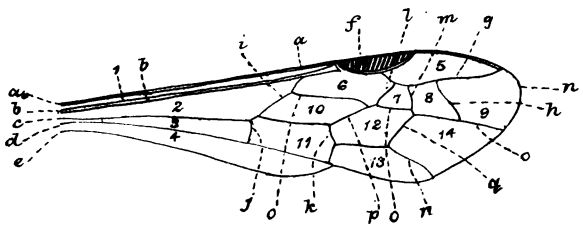
33. Nysson.

34. Nysson.

35. Nysson.

36 Gorytes

37. Gorytes.



41. Mellinus.

38. Hoplisus.

39. Hoplisus.

40. Mellinus.

42. Cerceris.

43. Philanthus.

44. Trypoxylon.

45. Crabro.

46. Crabro.

47. Oxybelus.

West, Newman & Co. sc.

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labrum produced into a simple point, and the posterior tibiæ simple.

(4) 1. Mesopleuræ with two horizontal crenate lines at right angles to the perpendicular one.
(3) 2. Face with a spine between the antennæ .. .. *cornigera.*
(2) 3. Face without a spine .. .. *insignis.*
(1) 4. Mesopleuræ with only one horizontal crenate line at right angles to the perpendicular one.
(6) 5. Labrum black .. .. *gracilis.*
(5) 6. Labrum white.. .. .. *monilicornis.*

1. *cornigera*, Shuck. ♀ nec ♂. Foss. Hym. p. 191 = *insignis*, Shuck. ♂ nec ♀.

Black; ♂ with the tubercles and tegulæ pale; the mandibles, palpi, and basal joint of the antennæ in front flavous; the tibiæ, tarsi, and extreme apex of the femora testaceous, the posterior tibiæ with a dark cloud across the middle. ♀ resembling the ♂, but having the mandibles, &c., pitchy brown instead of flavous. Head and thorax finely punctured, more or less shining, the former nearly square on the vertex, face below the antennæ silvery, between the antennæ armed with a sharp spine in both sexes, first joint of antennæ large and conical; thorax very closely punctured, in front with two impressed longitudinal lines, extending not quite to the centre of the mesothorax, and with two smooth, slightly raised lines between them; the sides of the mesothorax are margined by a consute impression, and they have a longitudinal impressed straight line on their disk; there is also a consute impression between the mesothorax and scutellum; sides of the mesothorax below the wings with two longitudinal consute impressions, united in front by a transverse one; metathorax elongate and clathrately rugose; abdomen finely and rather closely punctured, the posterior margins of the segments narrowly red; apical segment in the ♂ with an upturned curved process.

Length 6—7 mill.

Hab.—London district, &c.; not rare.

I have followed Thomson and other continental authors in considering the ♂ and ♀ with frontal spines as sexes of the same species. On what grounds our English hymenopterists, Shuckard and Smith, separated them, I

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do not know, but the puncturation and other characters of the sexes with the spines are so similar that I feel no doubt that the continental authors are right in their views.

2. *insignis*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 81 = *cornigera*, ♂, Shuck.; *insignis*, ♀, Shuck.

Differs from the preceding in being less elongate, and in having the face without a frontal spine in either sex. The thorax is much more rugosely punctured, and the parallel impressed lines in front strongly reticulated, especially in the ♂; the posterior margin of the mesothorax is also slightly wrinkled or crenate within the reflexed edge in the ♀, strongly so in the ♂; the colour is almost identical in the two species, except that the mandibles in the ♂ of this are often entirely black.

Length 6—7 mill.

Hab.—Widely distributed, and not rare; London district, Hastings, Hayling Island.

3. *gracilis*, Curt. Brit. Ent. xi. pl. 496.

Like the two preceding in general appearance, but distinguishable at once by the sides of the thorax below the wings, having only one transverse consute line instead of two; the puncturation of the thorax is more like that of *cornigera*, and the surface of the thorax somewhat shining, the tubercles black.

Length 6—7 mill.

Hab.—Generally distributed and common.

4. *monilicornis*, Dbm. Hym. Eur. 1, p. 243, 143.

Larger than *gracilis*, and with a wider mesothorax, distinguishable also by the pale tubercles and the white labrum, and the much wider 2nd submarginal cell of the wings, also in having the 2nd segment of the abdomen not constricted at the base; from the other species it differs in the single transverse consute line on the sides of the thorax below the wings.

Length 8 mill.

Hab.— Chobham; Wallholme, E. Cumberland, Bold; Dorsetshire, Dale; Gloucestershire, V. Perkins.

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PEMPHREDON, *Latr.* (Pl. VIII. fig. 27).

Hist. Nat. vol. xiii. p. 325.

= *Cemonus*, Jur.

This genus contains three of our commonest British species; they are much larger than any of the preceding, and may be easily recognised by the hairy head and thorax; the vertex of the head in the ♀ is very large and square, in the ♂ the sides of the head behind the eyes converge considerably; the abdomen has a long petiole, and the posterior tibiæ are more or less irregularly spinose.

(4) 1. 1st submarginal cell receiving both recurrent nervures.
(3) 2. Smooth space on the metathorax narrowly lunulate, its posterior margin well defined .. .. .. *unicolor*
(2) 3. Smooth space on the metathorax widely lunulate, its posterior margin not defined .. .. .. *lethifer.*
(1) 4. 1st and 2nd submarginal cells each receiving a recurrent nervure .. .. *lugubris.*

1. *lugubris*, Fab. Ent. Syst. ii. p. 302 = *luctuosus*, Shuck. Fig. Panz. Faun. Germ. 52, 24 (*unicolor*).

Entirely black; head rugosely punctured, and covered with long hairs; vertex with its sides converging towards the base in the ♂, quadrate in the ♀; mesothorax and scutellum rugosely punctured and hairy; metathorax rugose and covered with long hairs, with a semicircularly raised brow, which is not so coarsely rugose as the rest of the surface; petiole of the abdomen looked at from the side curved, above rugose, with long hairs above and beneath, rest of the abdomen shining, with long hairs at the base and apex, and on the under side; femora densely covered with hairs; tibiæ in the ♀ with irregular and occasional spines externally, densely covered on the side towards the body with short adpressed hairs.

Length 9—12 mill.

Hab.—Very common and generally distributed.

Var. *luctuosa*, Shuck., is a var. of the ♂ with the raised portion of the metathorax more or less shining and smooth.

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2. *unicolor*, Latr. Gen. Crust. et Ins. iv. p. 84. Fig. Smith Brit. Foss. Hym. pl. iv. fig. 3.

Usually smaller than *lugubris*, and differing from it in the characters of the wing-cells, as shown in the analytical table above; it has also the head and thorax largely but less rugosely punctured; the metathorax with a broad shining, slightly raised, semicircular smooth space below the base, which is well defined on both its edges; the abdomen also is distinctly punctured in both sexes.

Length 6—10 mill.

Hab.—Very common everywhere.

3. *lethifer*, Shuck. Foss. Hym. p. 201.

Differs from the above, only as far as I can see, by the wider smooth space on the metathorax, which is well defined on its upper margin, but not on its lower; the smooth space in *unicolor* rises up distinctly from the surrounding rugosities, whereas in *lethifer* the rugosities seem to diminish as they approach the lower margin of the space till the surface becomes merely punctured.

Hab.—Equally common as the last; may be bred freely from bramble stems.

CERATOPHORUS, *Shuck.* (Pl. VIII. fig. 28).
Foss. Hym. p. 195.

This genus is considered as a section of *Pemphredon* by Thomson, but it appears to me to be sufficiently well characterised to maintain; the clypeus is deeply and squarely notched, and the face between the antennæ has a short blunt process like a broken-off spine, its apex slightly emarginate; the face below the antennæ in the ♂ is not silvery, as in nearly all the genera of this family; the petiole of the abdomen in both sexes is shorter than in *Pemphredon*, and the posterior tibiæ without spines.

1. *morio*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 84. Var. = *anthracinus*, Sm.

Entirely black; head rugosely punctured, covered with erect paler hairs; face, on each side, between the antennæ

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and eyes, somewhat angularly raised, excavated between the projections, and in the middle of the excavation, just above the insertion of the antennæ, is a short blunt spine, having its apical margin emarginate; thorax covered with pale hairs; mesothorax and scutellum shining, largely and remotely punctured; metathorax rugose, brow shining and elevated, as in *Pemphredon unicolor;* abdomen shining, finely and remotely punctured, with the petiole short and rugose, not nearly so long as the rest of the segment, more or less hairy on the 3rd and following segments, apical segment in the ♀ very largely punctured, its margins slightly raised; beneath in the ♂ with a thick fringe of hairs across the middle of the 3rd, 4th, and 5th segments; tibiæ simple, without lateral spines; femora hairy beneath.

Length 6—7 mill.

Hab.—London district; rare.

MIMESIDÆ.

(2) 1. 2nd submarginal cell receiving both recurrent nervures .. .. *Mimesa.*

(1) 2. 2nd and 3rd submarginal cells each receiving a recurrent nervure .. .. *Psen.*

Mimesa, *Shuck.* (Pl. VIII. fig. 29).

Foss. Hymen. p. 228.

A genus which resembles *Pemphredon*, of the last family, very much in form, but differing in having three submarginal cells; from *Psen* the arrangement of the recurrent nervures distinguishes it, as shown in the table above. The form of the petiole is the chief specific characteristic among the members of this genus.

(6) 1. Body red at the base.

(3) 2. Petiole of the body flat, widening posteriorly; 3rd segment of body in ♀ entirely black .. .. *Shuckardi.*

(2) 3. Petiole of the body narrow and not widened posteriorly; 3rd segment in ♀ more or less red.

(5) 4. Mesopleuræ not punctured .. .. *bicolor.*

(4) 5. Mesopleuræ strongly punctured .. .. .. *equestris.*

(1) 6. Body entirely black.

(8) 7. Petiole carinated, not widening at the apex; carina not grooved .. .. *unicolor.*

(7) 8. Petiole widened at the apex, carina grooved .. *Dahlbomi.*

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1. *Shuckardi*, Wesm. Hym. Foss. Belg. 115, 5 = *equestris*, Shuck. (nec Fab. ?), Foss. Hym. p. 229. Smith, &c.

Black, with the two basal segments of the abdomen red, except the actual petiole, and usually a black spot on the disk of the 1st segment; antennæ beneath and apical joints of the tarsi fulvous. Head very finely and closely punctured, face in front of the antennæ covered with bright silvery hairs; thorax covered with very short pale hairs, punctured, but not so closely as the head; mesothorax with an impressed line on each side in front; metathorax longitudinally rugose at the base, deeply channelled behind, and irregularly and somewhat clathrately rugose at the sides, the sides also covered with silvery hairs; abdomen finely punctured, petiole wide, flat, and hairy above, widening towards the apex, apical segment in the ♂ with an upcurved process, in the ♀ hairy and deeply punctured and carinated at the sides; sides of the segments with a short adpressed silvery pubescence, especially towards their apex; tibiæ with short spines.

Length 9—12 mill.

Hab.—Hampstead, Yorkshire, Isle of Wight, and Sandhurst; also at Lowestoft.

2. *bicolor*, Jur. Hym. pl. xiii.

Very like the above, but distinguishable at once by the narrow carinated petiole, the almost impunctate body, the red 3rd segment (at least at the base), and the red colour of the tibiæ and tarsi, which are only clouded with black in the middle.

Length 7—9 mill.

Hab.—Hampstead Heath, Blackheath, &c.

3. *equestris*, Fab. (nec Shuck.) Syst. Piez. p. 182.

Extremely like *bicolor*, but has the mesothorax more strongly punctured, the sides of the mesothorax below the wings deeply and distinctly punctured, whereas in *bicolor* their puncturation is hardly visible, and the petiole of the body shorter and less distinctly carinated.

Hab.—Southwold, Chobham, &c.

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4. *unicolor*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 107.

Entirely black, except the pale calcaria and apices of the tarsi; and, besides the colour, differing from any of the preceding in having no tubercle between the antennæ, and no transverse carina on the clypeus, but a narrow raised line runs from the central ocellus to between the antennæ; petiole of the body with a smooth, raised central carina; the ♂ differs further in having the 7th segment of the body clearly visible from above.

Length 7—8 mill.

Hab.—Generally distributed. "Entering the straws of a thatched outhouse, Charlton, Kent," Smith.

5. *Dahlbomi*, Wesm. Hym. Foss. Belg. p. 108.

Like *unicolor* in colour, but easily distinguished by the sculpture of the petiole; in this species the petiole is flat, gradually widening to the apex, and bears two raised lines which unite at the apex, making a sort of lanceolate inclosure; the apical segment of the body in the ♀ is also very different, in *unicolor* it is widely flattened above, dull, and largely and closely punctured; in this species it is shining, narrowly flattened, with a carina on each side, and a slightly raised line in the middle, punctured between the elevations; the ♂ differs also in having a raised line on the under side of the 9th and 10th joints of the antennæ.

Length 7—9 mill.

Hab.—Chobham, &c.

Psen, *Latr.* (Pl. VIII. fig. 30).

Prec. Caract. Gen. Ins. p. 122.

Very like *Mimesa*, and differing from it in having each submarginal cell receiving a recurrent nervure.

(2) 1. Larger, petiole nearly twice as long as the rest of the 1st segment .. .. *ater.*

(1) 2. Smaller, petiole scarcely longer than the rest of the 1st segment .. .. *pallipes.*

1. *ater*, Fabr. Ent. Syst. Suppl. 244, 18. Fig. Jurine, Nouv. Meth. Hym. pl. viii. 6 (*serraticornis*).

Black, shining; ♂ with the antennæ, mandibles, palpi,

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anterior and intermediate legs beneath, except the femora and also the posterior tarsi, more or less fulvous. Head punctured, finely pilose, face densely covered with golden hairs, and with a short spine between the antennæ; antennæ in the ♂ with the scape very much dilated, flagellum compressed and dilated, the 8th to 10th joints excavated beneath and serrated; thorax finely pilose; mesothorax and scutellum punctured; wings slightly dusky; metathorax clathrately rugose, with a well-defined triangular basal area, which is longitudinally rugose; abdomen with the petiole long, (looked at sideways) curved, smooth, and somewhat flattened above, with a few long pilose hairs beneath, the rest of the abdomen finely punctured; apical segment in the ♀ very largely punctured and carinated at the sides; posterior tibiæ serrate; ♂ with the two basal joints of the intermediate tarsi produced at the sides.

Length 10 mill.

Hab.—Hawley, Hants; Lowestoft. Very rare.

2. *pallipes*, Panz. Faun. Germ. lii. 22 = *atratus*, Panz., Shuck., &c.

Much smaller than *ater*, black, with the antennæ beneath, anterior tarsi, and the anterior tibiæ in front testaceous in both sexes; the ♂ has also the intermediate tarsi pale; head closely and rugosely punctured, face below the antennæ covered with silvery hairs; between the antennæ is a well-marked carina, wide posteriorly, and sharpened anteriorly where it joins the carinated margin of the large antennal cavities; antennæ in ♀ short and somewhat thickened towards the apex; thorax largely punctured, more or less covered with rather short white hairs; wings hyaline; metathorax clathrately rugose, deeply and widely sulcate down the middle; abdomen shining, covered with short grey-white hairs, especially towards the apex; apical segment in the ♀ not more strongly punctured than the others; legs covered with short, fine, adpressed hairs.

Length 6—7 mill.

Very common generally. I have bred it from pierced bramble stems.

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NYSSONIDÆ.

(6) 1. Front wings with only three submarginal cells.
(3) 2. Front wings with the 2nd submarginal cell not petiolated .. .. *Harpactus.*
(2) 3. Front wings with the 2nd submarginal cell petiolated.
(5) 4. 1st and 2nd submarginal cells each receiving a recurrent nervure .. .. *Didineis.*
(4) 5. 2nd submarginal cell receiving both recurrent nervures .. .. *Nysson.*
(1) 6. Front wings with four submarginal cells, or at least with the 4th almost complete.
(10) 7. 2nd submarginal cell receiving both reccurrent nervures.
(9). 8. 4th submarginal cell incomplete; median nerve of hind wing becoming furcate beyond the posterior transverse nerve .. .. *Gorytes.*
(8) 9. 4th submarginal cell complete; median nerve of hind wing becoming furcate before the origin of the posterior transverse nerve .. .. .. *Hoplisus.*
(7) 10. 1st and 3rd submarginal cells each receiving a recurrent nervure .. .. *Mellinus.*

Harpactus, *Jur.* (Pl. VIII. fig. 31).

Nouv. Meth. Hym. p. 124, pl. x. 20 = *Arpactus*, Shuck., &c.

I have had great doubts as to the natural position of this genus and of the following, as they are so unlike the rest of the forms with which any structural classification seems to throw them, in colour and general appearance; however, I do not see any better position for them than in the Nyssonidæ, where F. Smith has placed them, and I have accordingly followed his views. *Harpactus* may be known at once from any of the other genera in the family by having only three submarginal cells, and the 2nd not petiolated; the abdomen shining, and red at the base.

1. *tumidus*, Panz. Faun. Germ. 81, 15.

Head and thorax black; scape of the antennæ, clypeus, and a spot on each side of the face, white; scutellum generally with a white central spot; antennæ in the ♂ more or less piceous; abdomen with the two basal segments red, a small white spot at the side of the apical margin of the 2nd segment, and a white spot on the 5th at the base in the ♀, or a white transverse line at its apex in the ♂; the 6th in the ♂ sometimes with a pale central line; these spots are all more or less liable to disappear;

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anterior and intermediate legs testaceous; the femora above, the tarsi and the apex of the intermediate tibiæ, fuscous, or in some nearly black; posterior legs black, with only the base of the tibiæ paler; head and thorax rather thickly clothed with short adpressed golden hairs, and covered with large scattered punctures; wings hyaline, nervures and tegulæ testaceous; metathorax with a well-defined triangular basal area, carinated in the middle, the margins of the area outside are radiately striate, the sides of the metathorax are covered with short whitish hairs; abdomen irregularly punctured; apical segment in ♀ with very large coarse punctures; tibiæ with a few spinose hairs.

Length 8—9 mill.

Hab.—Sandy places in summer; Deal, Lowestoft, Southwold, Erith, Hampstead, &c.

DIDINEIS, *Wesm.* (Pl. VIII. fig. 32).

Bull. Acad. Roy. Belg. xviii. No. 10.

= *Alyson*, Shuck.

Somewhat like *Harpactus* in form, but more slender, the metathorax longer and truncate at the apex, with prominent angles, the 2nd submarginal cell petiolated, and the apical joint of the antennæ in the ♂ shaped like a crescent.

1. *lunicornis*, Fab: Ent. Syst. Suppl. p. 249. Fig. Smith Brit. Foss. Hym. pl. iv. fig. 5, ♂. Curtis Brit. Ent. xiii. 584, ♀ = *Kennedii*, Curt.

Mandibles pale, with the apex piceous; antennæ piceous beneath; black, basal segment of the abdomen and the base of the 2nd in the ♂ and the two basal segments and the base of the 3rd in the ♀ red; wings with a brown band near the apex, covering the radial, 2nd submarginal, and part of the 3rd discoidal cell; legs piceous; head shining and very finely punctured in the ♂, dull and more coarsely so in the ♀; apical joint of the antennæ in the ♂ falcate; thorax very closely punctured; metathorax parallel-sided, with a lanceolate enclosure at the base, bounded by an elevated ridge, irregularly rugose within, radiately rugose outside, with a short dentate spine near the apex on each side; abdomen shining, finely punctured, 3rd and following

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segments with irregular erect hairs; apical segment in the ♂ with a delicate spine at each side; under side of all the segments, except the basal one, with long pilose hairs.

Length 7—9 mill.

Hab.—Worthing; Hastings; Ryde; Bristol; Lyme Regis. Rare.

NYSSON, *Latr.* (Pl. VIII. fig. 33).

Prec. Caract. Gen. Ins. p. 125.

A genus which may easily be determined by the square metathorax, truncate at the apex, and spined at the posterior angles. The wings have three submarginal cells, the 2nd petiolated; the abdomen is black, banded or spotted with yellow at the sides, the base in some species more or less red.

(4) 1. Anal cell of hind wings terminating considerably before the origin of the cubital nerve; 1st segment of body much narrower than 2nd. (Pl. VIII. fig. 34).

(3) 2. Tubercles of thorax black .. .. *spinosus.*

(2) 3. Tubercles of thorax yellow .. .. *interruptus.*

(1) 4. Anal cell of hind wings terminating at or beyond the origin of the cubital nerve; first joint of body as wide or wider than 2nd. (Pl. VIII. fig. 35).

(6) 5. Larger, thorax very rugose, with a yellow line in front; basal segment of the body very rarely red 3-*maculatus.*

(5) 6. Smaller, thorax only rugosely punctured, without a pale line in front; basal segment of body always brownish red .. .. *dimidiatus.*

1. *spinosus*, Fab. Syst. Ent. p. 373. Fig. Panz. Faun. Germ. 62, 15. (Pl. VIII. fig. 34).

Black, a band across the prothorax, often wanting in the ♂, and a band at the apex of the 1st, 2nd, and 3rd abdominal segments in the ♂, a spot on each side of the 1st segment in the ♀, and an interrupted band on the 2nd and 3rd, yellow; tubercles black; tegulæ pitchy; wings clouded; legs in the ♂ black, with the extreme apex of the femora, base and apex of the tibiæ, and tarsi red; legs in the ♀ red, with the femora more or less black at the base. Head and thorax very rugosely punctured, densely covered with short ochreous hairs in the ♂, sparsely so in the ♀; post-scutellum and metathorax clathrate, the latter hairy at its sides, especially in the ♂, and armed on each side with a short thick

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spine; abdomen dull in the ♂, more or less shining in ♀, 1st segment very largely and coarsely punctured, the rest more finely so; apex of the abdomen in the ♂ bidentate; basal segment above and all the segments beneath densely clothed with silvery hairs in the ♂; legs finely pubescent.

Length 10—12 mill.

Hab.—Widely distributed, and often common.

2. *interruptus*, Fab. Ent. Syst. Suppl. p. 266. Fig. Panz. Faun. Germ. 77, 18 (*dissectus*).

Very like the preceding, but shorter and more compact, and has the antennæ only a little longer than the head, and the tubercles yellow.

Length 8—9 mill.

Hab.—Hampstead and Highgate, and London district.

3. *trimaculatus*, Rossi. Faun. Etrusc. ii. p. 95. (Pl. VIII. fig. 35).

Shorter and broader than either of the above; thorax with a line at the base of the prothorax, and the tubercles yellow; scutellum sometimes with a yellow line; abdomen with a yellow spot at the side of the 1st, 2nd, and 3rd segments; legs black, knees and apex of tibiæ narrowly brown. Head and thorax largely and rugosely punctured, and covered with short whitish hairs; basal area of metathorax shining, with a series of parallel ridges; abdomen shining, largely and remotely punctured, especially on the basal segment, the puncturation becoming finer towards the apical segment, which is very finely and closely punctured; penultimate joint of the antennæ in the ♂ much larger than the apical joint, which is sinuate and excavated beneath.

♀ varies occasionally in having the base of the abdomen red.

Length 8—9 mill.

Hab.—Rare; Battersea, Southgate, Weybridge, &c. F. Smith says:—"I have most frequently captured this insect when beating bushes for Coleoptera; it mimics death in the same way as *Hedychrum* and *Chrysis*."

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4. *dimidiatus*, Jurine. Hym. pl. x. f. 22 = *guttatus*, Shuck.

Smaller than any of the above. Thorax with the tubercles only pale; abdomen with the basal segment and the base of the 2nd brownish red, sometimes the 2nd segment of this colour all over, 2nd and 3rd segments with a pale spot on each side; tibiæ and tarsi brown. Head and thorax rugosely punctured; apical joint of the antennæ in the ♂ twice as long as the penultimate, and bisinuate beneath; abdomen dull, with scattered, shallow, punctures, beneath with the ventral prominence almost obsolete.

Length 7 mill.

This very distinct little species is rare, but has occurred at Hastings, Littlehampton, Hampstead, Highgate, Weybridge, Southend, and Deal. July and August.

GORYTES, *Latr.* (Plate VIII. figs. 36 and 37).

Hist. Nat. vol. xiii. p. 308.

Like *Nysson* in coloration, but has the 2nd submarginal cell simple, and the 4th almost completed. The metathorax rounded posteriorly.

(2) 1. ♂ antennæ longer; tibiæ more or less black; ♀ basal joint of abdomen much narrower than 2nd, with only two spots .. .. *mystaceus*.

(1) 2. ♂ antennæ shorter; tibiæ entirely yellow; ♀ basal joint of abdomen not much narrower than 2nd, with a complete yellow apical band .. .. *campestris*.

1. *mystaceus*, Linn. Faun, Suec. ed. ii. p. 412. Fig. Panz. Faun. Germ. 53, 11, ♀. (Plate VIII. fig. 37).

Black, two spots at the base of the clypeus, a band at the base of the prothorax, the tubercles, the scutellum in the ♀, an interrupted band on the basal segment of the abdomen, and an entire band on the 2nd and 3rd, and occasionally a spot on the 4th, yellow. Tibiæ in the ♂ outwardly yellow; tarsi fuscous, paler at the base; tibiæ and tarsi in the ♀ entirely fulvous. Head and thorax deeply and closely punctured, covered with greyish hairs; face below the antennæ in the ♂ with silvery hairs; antennæ in the ♂ very long, reaching to about the middle of the 2nd abdominal segment; basal area of the metathorax longitudinally ridged, with a deep central furrow,

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sides clathrate; front wings slightly clouded at their base and upper margin; basal segment of the abdomen covered with longer hairs than the rest, rugosely punctured, especially at the base, where it is also rugosely striated, 2nd segment at the apex much wider than the first, puncturation finer and more regular, 3rd and following more finely punctured again; ♀ beneath with the 1st and 2nd segments dull, covered with a short brownish grey, adpressed pubescence, the 2nd largely punctured near the base, rest shining, punctured; ♂ beneath rugosely punctured.

Length 12—15 mill.

Hab.—Not uncommon during the summer, and generally distributed.

2. *campestris*, Linn. Faun. Suec. 2nd ed. p. 417. Fig. Panz. Faun. Germ. 98, 17 = *Fargeii*, Shuck. Foss. Hym. p. 214.

Differs from the preceding in having the antennæ in the ♂ distinctly shorter, and the clypeus nearly entirely yellow; the basal segment of the abdomen is wider, and there is a yellow band also on the 4th segment; the tibiæ and tarsi are entirely pale yellow.

The ♀ differs in having four wider abdominal bands, the tibiæ and tarsi yellower, and the 2nd segment of the abdomen beneath with only a few small punctures at the base.

Length 9—11 mill.

Hab.—Highgate, Wandsworth, Lowestoft, &c.; end of June, &c.

HOPLISUS, *Lep.* (Pl. VIII. figs. 38 and 39).

Ann. Soc. Ent. Franc. vol. i. p. 62.

Differs from the preceding genus in having a complete 4th submarginal cell, and in the neuration of the hind wings, as shown in the table of the Nyssonidæ. Smith has considered this genus as a part of *Gorytes*, but all the continental authors keep it distinct, and the difference in the neuration of the wings seems to me to be a quite sufficient cause of separation.

(4) 1. Basal segment of abdomen not constricted at the apex, its sides gradually diverging in nearly straight lines.

(3) 2. Band of the 2nd segment of the abdomen not wider than that of the 1st .. .. 4. *fasciatus*.

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(2) 3. Band of the 2nd segment of the abdomen much wider than that of the 1st .. .. .. *laticinctus.*

(1) 4. Basal segment of abdomen constricted at the apex, its sides much rounded .. .. *bicinctus.*

1. *quadrifasciatus*, Fabr. Syst. Piez. p. 298. Fig. Curt. Brit. Ent. xi. 524 (*libinitarius*). (Pl. VIII. fig. 39).

Black; clypeus of the ♂ widely yellow at the base, labrum with two yellow spots; clypeus of the ♀ with three pale spots, sometimes united, labrum unspotted, a spot on the margin of each eye, and the scape of the antennæ in front, yellow in both sexes, the basal joints of the flagellum rufescent in the ♀; prothorax with a yellow basal line; wings with the nervures pale brown, slightly tinged with brown, and having a brown cloud across the radial and 2nd and 3rd submarginal cells; scutellum with a pale apical line in the ♀; abdomen in both sexes with four yellow bands, the 2nd band not wider than the basal one; femora with the apices pale; ♀ with the tibiæ and tarsi entirely testaceous; ♂ tibiæ testaceous in front, posteriorly black, except at the base; tarsi testaceous, posterior pair fuscous towards the apex; head more or less hairy on the vertex, very finely punctured; mesothorax exceedingly finely punctured; metathorax with its basal area irregularly and longitudinally rugose, outside the basal area somewhat clathrate; abdomen shining, very finely punctured, basal segment not constricted at the apex; tibiæ with pale spines.

Length 11—12 mill.

Hab.—In woody places; generally distributed.

2. *laticinctus*, St. Farg. Ann. Ent. Fr. i. p. 66. Fig. St. Farg. Hym. pl. xxv. fig. 6.

Very like the preceding, but rather larger; the antennæ in the ♂ rather longer, the clypeus in the ♀ entirely yellow, the sides of the face with a broad yellow spot, and the antennæ beneath pale almost to the apex; basal area of the metathorax clathrate in both sexes, and the 2nd abdominal band much wider than the basal one, occupying not quite the whole apical half of the segment; tibiæ in the ♀ posteriorly, black near the apex.

Length 12—13 mill.

Hab.—Rare; New Forest.

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3. *bicinctus*, Rossi. Faun. Etrusc. App. p. 123. Fig. Smith Brit. Foss. Hym. pl. iv. fig. 6. Curtis Brit. Ent. xi. 524.

Like the preceding species in general colour, but very different in form, sculpture, &c. Head and thorax dull and distinctly and closely punctured; basal area of the metathorax finely striate, with a distinct central sulcature, sides rugosely punctured; abdomen with two spots on the basal segment, a wide band on the 2nd, and a narrow one on the 3rd, yellow; basal segment not nearly half so wide as the 2nd, its sides rounded, and converging again towards the apex, 2nd segment, at its extreme base, with a series of very short striæ.

Length 11 mill.

Hab.—New Forest, Hastings, London district?

MELLINUS, *Fab.* (Pl. VIII. fig. 40, 41).

Ent. Syst. ii. p. 285.

The elongate form, petiolated abdomen, and shining surface will distinguish the members of this genus from their allies; the neuration of the upper wings is very peculiar, as the recurrent nervures are received, one at the apex of the 1st submarginal cell, the other at the base of the 3rd.

(2) 1. Markings yellow; tibiæ and tarsi yellow; ♂ antennæ simple .. .. *arvensis*.

(1) 2. Markings white; tibiæ and tarsi reddish: ♂ antennæ with joints 8—11 beneath, produced, and subtuberculated .. .. *sabulosus*.

1. *arvensis*, Linn. Syst. Nat. ed. x. vol. i. p. 573. Fig. Panz. Faun. Germ. 17, 20 (*U. flavum*).

Black; the base of the clypeus in the ♂, the scape of the antennæ in front and a line on each side of the face, the raised posterior margin of the prothorax, the tegulæ and a spot under each wing, and the scutellum, yellow in both sexes; abdomen in the ♂ with a central, usually interrupted, band on the 3rd segment, a spot on the 6th, and sometimes indications of bands on the 2nd, 4th, and 7th segments, yellow; ♀ with a spot on each side of the basal segment, a very wide band on the 2nd and 3rd, an interrupted band on the 4th, and nearly the whole of the

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5th segment yellow, the band on the 4th segment sometimes continuous; legs yellow; the base of the femora black. Head and thorax finely, closely, and rugosely punctured, especially in the ♀; face below the antennæ covered with long testaceous hairs; antennæ simple in both sexes; metathoracic basal area somewhat smooth, depressed in the middle, and rugose, bounded by a narrow consute line, sides finely hairy and rugose; body shining, with obsolete, scattered punctures on the 1st, 2nd, and 3rd segments, more closely punctured on the following, petiole hairy; apical segment in the ♀ finely striate, with a few large punctures near the base; 5th and 6th segments in the ♀ and 7th in the ♂ more or less hairy; abdomen beneath with scattered hairs; tibiæ with pale spines.

Length, ♂ 8—11 mill., ♀ 13—15 mill.

Hab.—Common in many places, and generally distributed.

2. *sabulosus*, Fabr. Mant. Ins. i. p. 296. Fig. Smith Brit. Foss. Hym. pl. iv. fig. 4.

Rather smaller than the above, with the head and thorax less closely punctured; markings white instead of yellow; 2nd and 3rd segments of the abdomen each with a large transverse white spot on each side, the upper one in the ♂ often obsolete, a white band on the 5th segment in the ♀ and a spot on the 6th segment in the ♂ also white; legs fulvous, not yellow, as in *arvensis*; antennæ fulvous, except at the base above; ♀ with joints 8—11, produced beneath, and subtuberculate, their lower margin dentate at the apex.

Length, ♂ 8—9 mill., ♀ 12—13 mill.

Hab.—Generally distributed; Suffolk, Hants, Nottingham, Newcastle; sometimes very common.

CERCERIDÆ.

(2) 1. 2nd submarginal cell petiolated .. .. .. *Cerceris.*
(1) 2. 2nd submarginal cell not petiolated .. .. *Philanthus.*

Cerceris, *Latr.* (Pl. VIII. fig. 42).

Hist. Nat. Ins. xiii. p. 315.

This is one of the most distinct genera of the Fossorial Hymenoptera; the 1st segment of the abdomen is narrower than the rest, being little more than half the

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width of the 2nd, and all the segments are constricted at the base and apex, the surface is deeply punctured, the apical constriction of each segment shining and impunctate; the abdomen in all the species is banded with black and yellow, and the front wings have the 2nd submarginal cell petiolated.

(2) 1. Basal triangle of metathorax smooth and shining *ornata*.
(1) 2. Basal triangle of metathorax striated.
(4) 3. 2nd or 3rd segment entirely pale, without a black basal band .. .. *sabulosa*
(3) 4. All the segments banded.
(8) 5. Clypeus of ♂ more or less toothed in front; clypeus of ♀ not emarginate.
(7) 6. Larger, penultimate segment of abdomen in the ♂ without a pencil of rigid setæ at the sides; clypeus of ♀ not raised .. .. *arenaria*.
(6) 7. Smaller, penultimate segment of abdomen in the ♂ with a pencil of rigid setæ on each side; clypeus of ♀ raised .. .. *labiata*.
(5) 8. Clypeus of ♂ not toothed; of ♀ emarginate .. 5-*fasciata*.

1. *arenaria*, Linn. Syst. Nat. ed. x. vol. i. p. 571. Fig. Smith Brit. Foss. Hym. pl. iv. fig. 8.

Black, with the following parts yellow, viz., entire face in the ♂ and scape of the antennæ in front; a spot on the clypeus and one on each side of the face in the ♀ and a spot behind each eye; a spot on each side of the prothorax, the tegulæ, and the post-scutellum in both sexes, and a spot on each side of the metathorax in the ♀; a band at the apex of each abdominal segment, except the apical one in the ♀, and of each, except the basal and apical ones, in the ♂; legs in the ♂, except the upper side of the femora of the anterior and intermediate pairs, and the apex of the femora of the posterior pair, and a spot at the apex of the posterior tibiæ within. Legs in the ♀ reddish, the two front pairs of femora black at the base, the posterior pair black above; under side of the ♂ with a yellow spot on each side of the 3rd and 4th segments of the abdomen; the ♂ has also sometimes a small round spot on each side of the basal segment of the body above; apical joint of the antennæ reddish, and generally the 2nd and 3rd in both sexes; wing nervures orange-brown. Head and thorax largely and coarsely punctured, rather densely hairy in the ♂, sparingly in the ♀; clypeus in the ♂ tridentate, with a

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thick fringe of bristles on each side near the eye, clypeus in the ♀ rounded in front; metathorax rugose in both sexes, its basal area longitudinally striate; abdomen strongly punctured, basal segment covered with long hairs; all the segments in the ♂ more or less hairy; apical segment flattened above, and largely punctured in the ♂, transversely rugose in the ♀, carinated on each side, and somewhat rounded at the apex, with a slight projection on each side; under side of all the segments in the ♂ with an apical fringe, and a few scattered hairs on the disk, in the ♀ almost naked.

Length 12—16 mill.

Hab.—Common in sandy places.

2. *5-fasciata*, Rossi. Faun. Etrusc. Mant. i. p. 139. Fig. Panz. Faun. Germ. 63, 12, ♂, 63, 17, ♀ (*interruptus*) = *interrupta*, Shuck.

Very like *arenaria*, but smaller, the puncturation of the thorax larger and more remote, and the pubescence less dense in the ♂; the clypeus in the ♂ simply truncate at the apex, and not obsoletely tridentate as in *arenaria*, that of the ♀ slightly raised (but not free), deeply and semicircularly emarginate in front; basal segment of the abdomen in the ♀ less hairy, and with only a very small reddish yellow spot on each side; apical segment rather narrower at the apex, the fringe of hairs on its lateral carinæ longer; penultimate segment of the ♂ with a small tuft of rigid pale setæ on each side at the apex; legs in the ♀ fulvous, those of the ♂ dark at the base of the femora of the two front pairs, and with a dark ring near the apex of the posterior pair.

Length 9—11 mill.

Hab.— Southend; Birch Wood; Lowestoft; Southwold, &c.

3. *labiata*, Fabr. Ent. Syst. ii. p. 269. Fig. Panz. Faun. Germ. 63, 16, ♀, 46, 2, ♂ (*arenarius*) ?

Almost exactly like the preceding in colour and size; the 1st segment of the body of the ♀ however has larger and paler yellow spots, and the posterior femora of the ♂ have a wider black apical band; the ♂ may be however separated at once by the 3-dentate clypeus, and the longer hairs of the abdomen beneath, and the ♀ by the

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raised and free clypeus, which is truncate in front, and not emarginate as in *5-fasciata*; the ♂ is rather like a small *arenaria*, but differs in having the tuft of rigid setæ on the penultimate segment like the preceding species.

Length 9—11 mill.

Common. Chobham; Southwold; Weybridge; Walmer; Southend, &c.

4. *sabulosa*, Panz. Faun. Germ. 63, 13. Var. = *quadricincta*, Shuck.

Differs from any of the above in having the 2nd and 3rd abdominal segments in the ♂ and the 2nd in the ♀ without the black angular band at the base; the metathorax has a yellow spot on each side in both sexes, and its central area is rugosely striate; the abdomen is dull, and much more strongly and closely punctured than in any of the preceding; apical segment in the ♂ strongly emarginate; antennæ fulvous, paler beneath, the scape yellow; legs entirely pale in the ♂.

Length 9—11 mill.

Hab.—Rare; Faversham; Canterbury.

5. *ornata*, Fab. Ent. Syst. ii. p. 290. Fig. Panz. Faun. Germ. 63, 10.

Very like *sabulosa*, but generally larger, and differs from all the species of the genus in having the basal area of the metathorax smooth, at least on its disk. The 3rd and 5th abdominal segments are generally entirely yellow, but sometimes there is a black spot in the middle of the base of the 2nd; the markings on the other segments are very variable; femora black at the base in both sexes.

Length 10—15 mill.

Hab.— Common, and widely distributed.

PHILANTHUS, *Fabr.* (Pl. VIII. fig. 43).

Ent. Syst. ii. p. 288.

Like *Cerceris* in the coloration, but with the abdomen shorter and more oval; the basal segment scarcely constricted at the apex, and almost as wide as the 2nd; the wings with the 2nd submarginal cell simple.

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1. *triangulum.* Fab. Syst. Ent. 372. Fig. Smith Brit. Foss. Hym. pl. v. fig. 1.

Head black; mandibles pitchy brown; clypeus, sides of the face, and a tricuspid spot above the clypeus, and the head behind the vertex pale yellow; thorax black, with the collar and post-scutellum, and sometimes a spot on the scutellum, yellow; abdomen yellow, with a wide triangular band at the base of each segment, except the apical one, black; legs yellow, base of femora black; the size of the triangular bands varies much; in some specimens they are reduced almost to a basal spot, so that the abdomen is almost entirely yellow. Head covered with short hairs, very finely and closely punctured, more coarsely so on the vertex; thorax hairy, like the head; mesothorax coarsely punctured, metathorax very closely and rugosely so; brow of the metathorax sometimes smoother and shining; abdomen deeply punctured, ovate; basal segment hairy above; all the segments beneath with a few scattered hairs; tibiæ and tarsi spinose.

Length 10—15 mill.

Hab.—Local. Hants; Sandown Bay; Pegwell Bay; Byfleet; Epping.

CRABRONIDÆ.

(2) 1. Neuration of hind wings complete .. .. *Trypoxylon.*
(1) 2. Neuration of hind wings incomplete.
(6) 3. Submarginal cell not confluent with the 2nd discoidal.
(5) 4. Eyes hairy .. .. *Entomognathus.*
(4) 5. Eyes naked .. .. *Crabro.*
(3) 6. Submarginal and 2nd discoidal cells confluent .. *Oxybelus.*

Trypoxylon, *Latr.* (Pl. VIII. fig. 44).

Prec. Caract. Gen. Ins. p. 121.

The very long clavate abdomen is the chief characteristic of this genus; the neuration of the wings also is different from that of any other genus amongst the Fossorials. The front wings have one distinct submarginal and one distinct discoidal cell, but a second submarginal and a 3rd discoidal are indicated by a series of indistinct nerves which at first sight are scarcely noticeable.

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(2) 1. Petiole very long and thin; 1st joint of abdomen twice or nearly twice as long as the 2nd .. *attenuatum*.

(1) 2. Petiole shorter and stouter; 1st joint of abdomen not nearly twice as long as the 2nd.

(4) 3. Larger; antennæ scarcely clavate; legs entirely black .. .. *figulus*.

(3) 4. Smaller; antennæ more or less clavate; knees and tarsi piceous .. .. *clavicerum*.

1. *figulus*, Linn. Syst. Nat. ed. x. vol. i. p. 570. Fig. Panz. Faun. Germ. 80, 16.

Black; apex of the mandibles red. Head and thorax dull, very finely and closely punctured, covered with very short greyish hairs; antennæ scarcely thickened at the apex; scutellum less closely punctured and somewhat shining; metathorax radiately rugose at the base, shallowly channelled down the middle, covered with short silvery hairs, transversely striate at its sides; wings with a slight apical cloud; abdomen covered with exceedingly short grey hairs; the apex of each segment, especially in the ♂, with a greyish band, widest at the sides; this is very liable to be rubbed off in old specimens; basal joint of abdomen not quite once and a half as long as the 2nd; apical segment in the ♀ with long bristly hairs; legs finely clothed with greyish hairs, their sides towards the body with a shining, sericeous pubescence.

Length 12—13 mill.

Very common, and generally distributed; appears in June.

2. *clavicerum*, St. Farg. Enc. Meth. x. p. 750.

Smaller than *figulus*, and easily distinguished by the shorter clavate antennæ, especially in the ♂, the apical joint being little longer than wide, the much more prominent forehead between the eyes, and the pale tegulæ and pale knees, and occasionally more or less pale tibiæ.

Length 6—8 mill.

Hab.—Common, and generally distributed.

3. *attenuatum*, Sm. Cat. Brit. Hym. App. p. 120. Fig. Smith Brit. Foss. Hym. pl. iv. fig. 2.

Narrower than either of the preceding, and at once distinguishable by the long thin 1st segment of the abdomen, which is twice as long as the 2nd; the joints are altogether more slender, being as long as or longer than

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wide. The puncturation of the thorax is finer, and the body rather more shining.

Length 8—9 mill.

Not rare. Chobham, Bristol, Reigate, &c. Appears in May and June, and may be bred from pierced bramble stems.

ENTOMOGNATHUS, *Dahlb.*

Hym. Eur. vol. i. p. 295.

Differs from *Crabro* in having the eyes hairy, and the mandibles sinuate near the base.

1. *brevis*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 72.

Black; scape of the antennæ in front, dilated portion of the mandibles at the base in the ♂, the tubercles, the anterior and intermediate tibiæ and tarsi in both sexes, and the femora except a black line beneath in the ♂, the posterior tibiæ at the base in the ♀ and almost entirely in the ♂, and the posterior tarsi in the ♂, flavous; apices of the anterior femora yellow in the ♀. Head and thorax shining, rather largely punctured, covered with short erect hairs; mandibles dentate at the base; eyes clothed with fine white hairs; basal area of the metathorax shining, surrounded and divided down the middle by consute impressions, sides finely pilose; abdomen finely punctured, the posterior margins of the segments narrowly piceous, apical segment piceous; posterior and intermediate femora denticulate and spinose.

Length 5—6 mill.

Hab.—Common in most places. May be known at once from any of the black species of *Crabro*, some of which it much resembles, by the hairy eyes and dentate mandibles at the base.

CRABRO, *Fab.* (Pl. VIII. figs. 45, 46).

Syst. Ent. p. 373.

This genus contains a number of species which vary exceedingly in form and colour, but the neuration of the wings is constant throughout. The front wings have one distinct submarginal and one distinct discoidal cell, without indications of further nervures. The only other genus that I have adopted, which has similar neuration, is *Entomognathus*, which is characterised by its hairy eyes.

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Crabro vestitus, Sm. Brit. Foss. Hym. p. 131, I can find no trace of in his collection, and it is omitted in his Catalogue of 1871; I have therefore omitted it, presuming it to be identical with some other species.

CRABRO.

(4) 1. Body petiolated; 1st segment terminating in a node.

(3) 2. Face with a blunt spine between the antennæ; apex of the tibiæ red .. .. *tibialis.*

(2) 3. Face without a spine; apex of tibiæ black .. *clavipes.*

(1) 4. Petiole of body, if present, very short; 1st segment not terminating in a node.

(56) 5. Abdomen not strongly punctured.

(41) 6. Ocelli in an equilateral triangle.

(40) 7. Cheeks beneath without a strong spine.

(33) 8. Abdomen entirely black.

(22) 9. Last segment of abdomen in ♂ not more strongly punctured than the preceding, excavated in the ♀.

(17) 10. Basal area of the metathorax not clearly defined.

(12) 11. Posterior tibiæ very clavate and rounded, without spines or teeth .. .. *capitosus.*

(11) 12. Posterior tibiæ more or less dentate or spinose.

(16) 13. Metathorax with a wide central channel, which is distinctly margined; front legs of the ♂ simple.

(15) 14. Legs entirely black .. .. *leucostoma.*

(14) 15. Front legs testaceous-brown .. .. .. *pubescens.*

(13) 16. Metathorax with a simple, narrow, central impressed line; front legs of ♂ scutate .. .. *cetratus.*

(10) 17. Basal area of metathorax clearly defined.

(19) 18. Puncturation of thorax so fine and indistinct as to be scarcely visible, except with a high power .. .. *podagricus.*

(18) 19. Puncturation of thorax distinct.

(21) 20. Clypeus black; front legs of ♂ scutate .. *gonager.*

(20) 21. Clypeus flavous; front legs of ♂ simple .. *Aphidum.*

(9) 22. Last segment of the body in the ♂ more strongly punctured than the preceding; not excavated in the ♀.

(26) 23. Front legs of ♂ scutate, both sexes with the calcaria of front legs black, or with the clypeus and mandibles yellow.

(25) 24. Larger, basal area of metathorax large, shining, and finely strigose; ♂ tibiæ scutate; clypeus and mandibles yellow .. .. *palmarius*

(24) 25. Smaller, basal area of metathorax small, dull, and very coarsely striate; ♂ tibiæ simple; 1st joint of tarsi scutate; calcaria in both sexes black .. .. *palmipes.*

(23) 26. Calcaria of front legs pale; clypeus not yellow.

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(30) 27. Mesosternum spinose at the sides.
(29) 28. Metathoracic area striated .. .. .. *varius.*
(28) 29. Metathoracic area smooth and shining .. *exiguus.*
(27) 30. Mesosternum not spinose.
(32) 31. Thorax more or less shining; puncturation fine, but not so very close; tibiæ widely pale at the base; metathoracic area polished and shining in both sexes, rarely finely striate in the ♂ *Wesmaeli.*
(31) 32. Thorax dull; puncturation very close; tibiæ very narrowly pale at the base; metathoracic area deeply striate in the ♂, striate at the sides only in the ♀ .. .. *elongatulus.*
(8) 33. Abdomen black and yellow.
(37) 34. Recurrent nervure emitted just beyond the middle of the submarginal cell. (Pl. VIII. fig. 45)
(36) 35. Posterior tibiæ of the ♂ spinose, those of the ♀ much and closely spined .. .. .. *dimidiatus.*
(35) 36. Posterior tibiæ of the ♂ not spined, those of the ♀ less spined than in the preceding .. *signatus.*
(34) 37. Recurrent nervure emitted considerably beyond the middle of the submarginal cell. (Pl. VIII. fig. 46).
(39) 38. 2nd segment of the abdomen beneath without a pilose spot on each side .. .. .. *vagabundus.*
(38) 39. 2nd segment of the abdomen beneath with a pilose spot on each side .. .. *cephalotes.*
(7) 40. Cheeks beneath with a strong spine .. .. *4-maculatus.*
(6) 41. Ocelli in an isosceles triangle much widest at the base.
(53) 42. Abdomen black and yellow.
(48) 43. Mesosternum without a short raised crest in front of the intermediate coxæ; ♂ antennæ fusiform; tibiæ patellated.
(45) 44. Thorax above striated .. .. *cribrarius.*
(44) 45. Thorax above not striated.
(47) 46. Anterior angles of prothorax prominent .. *peltarius.*
(46) 47. Anterior angles of prothorax obtuse .. .. *scutellatus.*
(43) 48. Mesosternum with a short raised crest in front of the intermediate coxæ.
(52) 49. Thorax punctured and sometimes longitudinally striate, but not transversely striate in front.
(51) 50. Thorax posteriorly and scutellum striate among the punctures; 3rd abdominal segment banded with yellow .. .. *chrysostoma.*
(50) 51. Thorax and scutellum rugosely punctured; 3rd abdominal segment entirely black .. .. *vagus.*
(49) 52. Thorax transverely striate in front, longitudinally behind .. .. *interruptus.*
(42) 53. Abdomen entirely black or bronzy.
(55) 54. Abdomen bronzy black; head not wider than the thorax .. .. *albilabris.*
(54) 55. Abdomen without a bronzy tint; head wider than the thorax .. .. *Panzeri.*
(5) 56. Abdomen strongly punctured.. .. .. *clypeatus.*

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1. *tibialis*, Fabr. Ent. Syst. Suppl. p. 271. Fig. Smith Brit. Foss. Hym. pl. iii. fig. 8 = Curtis Brit. Ent. xv. 656.

Black; ♂ with the scape of the antennæ, the under side of the flagellum near the base, and the whole of the 7th, 9th, and 11th joints white; ♀ with the scape and under side of the antennæ piceous; mandibles yellow at the apex in the ♂, piceous in the ♀; thorax with the tubercles and tegulæ pale in both sexes, as well as the apex of the abdomen; extreme apices of the femora, the bases of all the tibiæ, the front tibiæ entirely, and the front and intermediate tarsi white; intermediate and posterior tibiæ brown across the middle and red at the apex; posterior tarsi brown. Head and thorax shining, finely and rather remotely punctured; face between the antennæ with a blunt spine; antennæ in the ♂ with the 2nd joint transverse and triangularly produced at the side, the two following sinuate at the base, and much widened at the apex; antennæ in the ♀ simple; metathorax at the base shining, with a central impressed line, sides covered with fine white pubescence, basal area not defined laterally; abdomen shining and polished, basal segment narrow and very clavate at the apex; genitalia of the ♂ fringed with long hairs at the sides; apical segment in the ♀ carinated at the sides and covered with erect hairs; posterior tibiæ in both sexes very clavate, and armed exteriorly with irregular spines; 1st joint of the anterior tarsi in the ♂ very long and dilated, of the intermediate tarsi long and angularly produced near the base.

Length 6—7 mlll.

Hab.—Not common. I have taken it at Wandsworth. F. Smith says that it is one of the species that burrow into the pith of bramble stems.

2. *clavipes*, Linn. Syst. Nat. ed. x. vol. i. p. 569 = *rufiventris*, Pz., &c. Fig. Panz. Faun. Germ. 72, 12 (*rufiventris*).

Like the preceding in shape, but differs in the following particulars: the ♂ has the scape only of the antennæ white, and the 6th only sinuate beneath, the tarsi simple, and the abdomen with a red band; the ♀ differs in having the scape of the antennæ white, the abdomen with a red central band, its apical segment not covered

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with erect hairs, the posterior and intermediate tibiæ black at the apex, not red as in *tibialis*, their interior margin almost without spines.

Length 6—7 mill.

Hab.—Generally distributed. May be bred from perforated bramble sticks.

3. *capitosus*, Shuck. Foss. Hym. p. 159.

Black; the anterior tibiæ in front, the anterior and intermediate tarsi, and the extreme base of the posterior tibiæ whitish. Head and thorax finely and remotely punctured; metathorax with a transverse crenate line at its extreme base, otherwise smooth and rounded, slightly wrinkled posteriorly at the sides, and with a longitudinal channel near the apex; abdomen shining, widened towards the apex; apical segment in the ♀ with a sharp carina on each side, and impressed at the apex, covered with long erect hairs; apical segment in the ♂ shining, scarcely punctured; posterior tibiæ very clavate in both sexes, without spines.

Length 8 mill.

Hab.—London district, Chobham, Reigate, Tunbridge Wells, Dorsetshire, Yorkshire. Rare.

4. *leucostoma*, Linn. Syst. Nat. ed. x. vol. i. p. 571.

Black, shining, with the calcaria pale, as well as the base of the posterior tarsi in the ♀. Head widely channelled between the eyes, finely and remotely punctured, with erect hairs on the vertex; clypeus covered with bright silvery hairs; thorax very finely and irregularly punctured; metathorax smooth and shining at the base, with a deep central sulcature in the ♀, a shallow one in the ♂; sides of the metathorax dull, punctured, and finely pubescent, but not separated from the shining basal area by any distinct impressed line or sulcature; wings slightly brownish; abdomen shining, nearly impunctate, regularly ovate in the ♀, its widest part being about the apex of the 3rd segment; elongate in the ♂; apical segment in the ♀ acuminate, with a sharp carina on each side, and a slightly raised central ridge, the extreme apex piceous; tibiæ of the posterior legs irregularly spinose.

Length 6—10 mill.

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Hab.—Generally distributed and common. The widely sulcate face will distinguish this species from any of its allies.

5. *pubescens*, Shuck. Foss. Hym. p. 165.

♂ like a small *leucostoma*, but with the face not sulcate; the head and thorax rather more hairy; the metathorax smooth at the base, and sulcate down the middle, irregularly rugose at the sides; anterior and intermediate femora and tibiæ piceous in front.

Length 7 mill.

Hab.—Charlwood, Surrey, 1 ♂; and 1 ♂ from Shuckard's collection. I do not know the ♀.

6. *cetratus*, Shuck. Foss. Hym. p. 131. Fig. H. Schäff. Faun. Germ. 179, 2, 3 (*dilatus*).

Black, shining; the calcaria and the margins of the dilated anterior tibiæ of the ♂ pale. Head and thorax punctured, rugosely so in the ♂; clothed with short erect hairs; metathorax crenate at the extreme base; finely and diagonally rugose in the ♂ and clothed with whitish hairs; nearly smooth, and somewhat shining in the ♀; in both sexes with a narrowly impressed line down the centre; abdomen shining, the extreme apex in the ♀ piceous; apical segment in the ♀ acuminate, with a sharp carina on each side above, and clothed at the sides with erect hairs; posterior tibiæ with short spines; anterior tibiæ in the ♂ dilated and widely rounded on their outer margin, which is pale, somewhat membranous, and ciliated; 1st joint of the front tarsi in the ♂ also dilated. Length 7—8 mill.

Hab.—London district, Weybridge, Bristol, and Lanercost in Northumberland; rare.

The ♂ is distinct from all the species by the front tibiæ; the ♀ can only be confounded with *leucostoma*, from which the narrow central line of the less shining metathorax will easily separate it; in *leucostoma* the central impression is a distinct excavation, with a sharp margin on each side.

7. *podagricus*, V. der Lind. Nouv. Mem. Acad. Brux. v. p. 62.

Black; the scape of the antennæ in front, the anterior and intermediate femora in front in the ♂, and the

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anterior and intermediate tibiæ and tarsi in both sexes yellow, except a black spot on the under side of the tibiæ; posterior tibiæ black; narrowly pale at the base. Head and thorax somewhat dull, very finely punctured, the puncturation only visible under a strong lens; mesothorax with a short, double, impressed line from the middle of the anterior margin; wings hyaline, with a very faint cloud along the radial cell; metathorax with a somewhat heart-shaped basal area, enclosed by a wide, well-defined consute line, the enclosure punctured and finely sulcate down the middle; from the apex of the enclosure runs a deeply-impressed channel; abdomen shining; apical segment above in the ♂ smooth, scarcely punctured, in the ♀ acuminate, and carinated at the sides with a trilobate fovea at the apex; anterior femora in the ♂ fringed with long hairs beneath; posterior tibiæ in both sexes very clavate; the outer margins irregularly dentate.

Length 6 mill.

Hab.—Generally distributed.

The exceedingly fine puncturation of the thorax will distinguish this from any other of its group.

8. *aphidum*, St. Farg. Ann. Soc. Ent. Fr. iii. p. 789
= Walkeri, Shuck., Smith, &c.

Black; clypeus, mandibles, and the scape of the antennæ, yellow; thorax with a spot on each side of the collar, the tubercles and tegulæ yellow; scutellum and post-scutellum in the ♀ generally with a yellow spot, often wanting in the ♂; ♂ with the anterior and intermediate legs, except the base of the femora above, yellow; posterior legs, with the base of the tibiæ widely, and 1st joint of the tarsi, yellow. The ♀ has the anterior knees only yellow, and a black spot on the tibiæ of the anterior and intermediate legs. Head and thorax punctured; clypeus covered with shining, silvery hairs; metathorax with a shining basal area, crenate at the extreme base, bounded by a consute line, and divided down the middle by a consute impression; abdomen regularly ovate, finely punctured, and clothed with a somewhat sparse grey pubescence; tibiæ in the ♂ without spines or teeth on their outer margin.

Length 7 mill.

Hab.—Very rare. I have Shuckard's type of the ♂,

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and Mr. C. W. Dale has sent me a ♂ and ♀ for examination, taken in Dorsetshire.

9. *gonager*, St. Farg. Ann. Soc. Ent. Franc. iii. p. 785. = *ambiguus*, Dhlb. Hym. Eur. p. 336.

Black; anterior tibiæ paler at the apex and anterior margin; 1st and 2nd joints of the anterior and intermediate tarsi white; the basal joint of the anterior tarsi with three black spots; posterior tibiæ narrowly pale at the base; all the calcaria pale.

♂ shining; head and thorax finely and somewhat remotely punctured; metathorax with a shining enclosure at the base, surrounded by a wide crenate sulcature, and divided down the middle by a narrow crenate line; metathorax below the enclosure irregularly rugose; abdomen finely punctured, and covered with fine very short hairs, which are only observable under a high power; anterior tarsi with the basal joint widely scutate, pale, with three round black spots; the 2nd, 3rd, and 4th joints also dilated and pale, each smaller than the one preceding it; the 2nd and 3rd each with a small black spot in front; posterior tibiæ irregularly spinose on their exterior margin.

♀ with the anterior tarsi simple; the scape of the antennæ, the anterior tibiæ in front, and the posterior tibiæ widely at the base, pale; apical segment of the abdomen canaliculated.

Length 6—7 mill.

I have only seen the ♂ of this species, of which Mr. Vincent Perkins has had the good fortune to take several in Gloucestershire, to whom I am indebted for the specimen described.

10. *palmarius*, Schreb. Naturf. xx. p. 100, pl. ii. fig. 9, ♂ (1784) = *scutatus*, Fab., Dahlb., Smith, &c.

Black; mandibles, clypeus, scape of the antennæ in front, a line on the prothorax, and the post-scutellum yellow in both sexes; the ♂ has also the cheeks just above the mandibles and on their under side, the tubercles, and the under side of the prothorax, and the scutellum yellow; anterior and intermediate legs in the ♂ yellow; the femora beneath, an irregular spot at the apex of the dilated anterior tibiæ, and the 1st joint of the tarsi posteriorly black; intermediate tibiæ black

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beneath; posterior legs, with the base of the tibiæ and tarsi only, yellow; ♀ with the anterior and intermediate tibiæ in front, the posterior tibiæ at the base, the anterior tarsi entirely, and the base of the others, yellow; head finely punctured, slightly chanelled in front; clypeus and face below the antennæ covered with brilliant silvery hairs; thorax rather more shining than the head, and not so finely punctured; mesothorax with a double dorsal line in front; sides of the mesothorax covered with bright silvery hairs, and with a slight spine posteriorly; metathorax with a very finely striate basal area, which has a central consute impression; abdomen shining, very finely punctured; apical segment in both sexes with a few very large scattered punctures; front femora in the ♂ swollen; tibiæ largely dilated and membranaceous posteriorly; tarsi with the basal joint produced and dilated; intermediate and posterior legs simple, as well as all the legs in the ♀; posterior tibiæ in both sexes with pale spines on their outer margin.

Length 7—8 mill.

Local; Birch and Darenth Woods, Southend, Devonshire, Lowestoft, Wimbledon, &c.

11. *palmipes*, Linn. Syst. Nat. ed. xii. 1, p. 944 = *tarsatus*, Shuck.

Smaller than the above; black, shining; scape of the antennæ in front, two transverse spots on the collar; ♂ with a transverse spot on the scutellum, the anterior legs in front, the intermediate tibiæ in front and at the base, the posterior tibiæ at the base, and the basal joint of the intermediate tarsi, yellow; ♀ with the anterior tibiæ in front, and the base of the other tibiæ and tarsi, pale. Head finely punctured with a narrow dorsal line; thorax not quite so finely punctured as the head; metathorax crenate at the base, divided down the middle by a wide consute channel, on each side of which is a transverse, somewhat raised space, which is deeply and diagonally striate; metathorax towards the apex transversely rugose; mesothorax posteriorly with a distinct lateral spine beneath; abdomen finely punctured; anterior tarsi in the ♂ with the basal joint dilated posteriorly, its margin rounded, the 2nd and 3rd joints produced on each side, and triangular; legs in the ♀ simple.

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The ♂ is easily known by its dilated tarsi; the ♀ is very like that of *varius*, but the black calcaria of the front tibiæ are a distinguishing character; the spines of the mesopectus are rather more developed, and the crenate line round the basal area of the metathorax deeper.

Length 6—7 lines.

Hab.—London district; Deal; Shanklin, Isle of Wight; Bristol. Mr. Bridgman has taken both sexes at Norwich.

12. *varius*, St. Farg. Ann. Soc. Ent. Fr. vol. iii. p. 775. = *spinipectus*, Shuck.

Very like the preceding, but the ♂ differs in having the anterior tarsi simple and the calcaria pale, the ♀ in having the calcaria pale and the other characters pointed out at the end of the last description, also in sometimes having a yellow spot on the scutellum; the basal joint of the anterior tarsi in the ♂ has a black central band, which will easily distinguish it from any of its other allies; the ♀ might be confounded with *anxius* on account of the spines on the mesopectus, but the striate basal area of the metathorax easily separates it from that species.

Length 6 mill.

Hab.—Generally distributed, and not rare.

13. *anxius*, Wesm. Hym. Foss. Belg. p. 137 = *exiguus*, Shuck. Foss. Hym. p. 174.

Black, shining; mandibles piceous at the apex; scape of the antennæ yellow beneath; collar with two small yellow spots; tubercles in the ♂ of the same colour; apex of the abdomen in both sexes testaceous; ♂ with the femora, tibiæ, and tarsi of the anterior and intermediate legs yellow in front; posterior tibiæ yellow at the base; ♀ with the anterior and intermediate tibiæ and tarsi yellow in front; posterior tibiæ yellow at the base; basal joint of the tarsi pale. Head and thorax finely punctured; mesothorax in front with three slightly raised lines; metathorax crenate at the base; the basal area shining and almost smooth, divided down the middle, and surrounded by wide, deeply crenate impressions; mesopleura each with a minute spine-like tooth; abdomen ovate, shining; tibiæ spinose exteriorly.

Length 5—6 mill.

Hab.—Battersea Fields, Shuckard. Earlham, Suffolk, Bridgman.

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This is a very distinct species, and one of our smallest; from *varius*, which is the only other one of this section with a spine on the mesopleura, it differs in the shining, almost smooth basal area of the metathorax, and from all the species in the regularly ovate shape of the abdomen.

14. *Wesmaeli*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 65.

Black, shining; scape of the antennæ yellow in front; sometimes with a spot on each side of the collar, the tubercles, and the scutellum yellow; apex of the abdomen testaceous; femora yellow at the extreme apex in both sexes, and beneath in the ♂; anterior and intermediate tibiæ yellow, except a black line behind; posterior tibiæ widely yellow at the base; tarsi with the basal joint pale, the rest more or less fuscous. Head and thorax punctured; metathorax with the basal area shining, surrounded by wide crenate lines, and divided down the middle by a narrow crenate line; metathorax below the basal area also bounded at each side by a crenate impression, and with a central crenate line; abdomen finely punctured; tibiæ spinose on their outer margin; intermediate tibiæ simple.

Length 5—6 mill.

Common, and generally distributed.

15. *elongatulus*, V. d. Lind. Nouv. Mem. Acad. Brux. v. p. 64 = *propinquus*, Shuck.; *hyalinus*, Shuck.; *obliquus*, Shuck.; *pallidipalpis*, Shuck.; *transversalis*, Shuck.; *luteipalpis*, Smith; *scutellaris*, Sm.; var. *proximus*, Shuck.

Very like *Wesmaeli* in the ♀, but both sexes may be easily distinguished thus:—The ♂ of this species has the mandibles, palpi, anterior femora and tibiæ in front, and generally the intermediate tibiæ in front, yellow; the rest of the insect black; the basal area of the metathorax very deeply strigose and dull; the intermediate tibiæ rather suddenly thickened just below the base; the ♀ has the legs much darker than in *Wesmaeli*, the tibiæ being pale only at the extreme base of the intermediate and posterior pairs; the scutellum black, and the apex of the abdomen scarcely piceous; the puncturation of the thorax is distinctly closer and finer, and the surface less brilliant;

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the area of the metathorax finely striate near the margins.

Length 5—6 mill.

London district, Chobham, Hastings, Norwich, &c.

16. *dimidiatus*, Fab. Ent. Syst. ii. p. 298. Fig. Panz. Faun. Germ. 46, 8.

Head and thorax black; mandibles more or less piceous, and sometimes yellow; scape of the antennæ in the ♀ yellow, with a black line above; two spots on the collar, a line on the post-scutellum, and sometimes the scutellum itself yellow; abdomen with a band on the basal segment near the apex, two small round spots on the 2nd segment, two larger transverse lateral spots on the 3rd and 4th, and nearly the whole of the 5th and 6th yellow. The ♂ is generally darker, having the 5th and 6th segments often unspotted, and the 7th pale at the apex; in some ♀ the body is nearly entirely yellow, with only a narrow black band at the base of the 2nd and 3rd segments; in some ♂ the body is nearly entirely black, with only a narrow band on the basal segment, and a spot on each side of the 3rd, yellow. ♂ with the anterior and intermediate tibiæ in front, and the posterior tibiæ at the base, and sometimes also near the apex, and all the tarsi, yellow; ♀ with all the tibiæ and tarsi yellow, with generally a black spot on the former in front. Head shining, shallowly punctured; vertex with two deep impressions united posteriorly in the ♀, and the face channelled; these impressions are less strongly marked in the ♂; thorax somewhat shining and shallowly punctured in the ♂, dull and very closely punctured in the ♀; metathorax with the basal area shining, crenate at the base, surrounded by an impressed line, and widely sulcate down the centre; sides of the metathorax more or less hairy, especially in the ♂; abdomen shining, somewhat petiolated, with the basal segment about once and a half as long as wide, regularly elongate-ovate, apical segment in the ♀ largely punctured; posterior tibiæ in both sexes irregularly spinose; anterior tibiæ in the ♂ triangularly produced near the base beneath.

Length 12 mill.

Hab.—Common in many places, and generally distributed.

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17. *signatus*, Panz. Faun. Germ. 53, 15.

Very like *dimidiatus*, but differing in the following particulars:—The ♂ has the tibiæ without spines, and the posterior femora with a small tooth near the base beneath; the ♀, according to Wesmael, differs in having the petiole of the body slightly thicker and shorter, each of the excavations of the vertex divided in two by an oblique carina, and the tibiæ entirely yellow without spots. Thomson says that the tibiæ also are less spinose. Length 11—12 mill.

The ♂ only appears to have occurred in England, but I suspect the ♀ is overlooked for that of the preceding species. The ♂ has been taken at Swansea by Mr. Dossetor, and at Eaton, near Norwich, by Mr. Bridgman.

18. *vagabundus*, Panz. Faun. Germ. 53, 16.

Head and thorax black; scape of the antennæ beneath, the entire collar or two spots on it, and a spot on the scutellum in the ♀, yellow; abdomen black; ♂ with the 2nd and 3rd segments having a transverse yellow lateral spot on each side, the 6th segment with a central transverse spot, and the 7th generally pale, sometimes the 4th segment also with two lateral spots, and the 5th with a central one; ♀ with a narrow band on the 1st segment, a broad interrupted band at the base of the 2nd and 3rd, a continuous band on the 4th, and the whole of the 5th yellow; apical segment more or less piceous; legs in the ♂ yellow, with the femora above and the whole of the posterior pair black; intermediate and posterior tibiæ more or less black at the apex; ♀ with the femora black; tibiæ and tarsi yellow. Head and thorax rugosely punctured, hairy, vertex of the former impressed; antennæ simple in both sexes; cheeks not spined; basal area of metathorax shining, smooth, surrounded by a deeply consute impression, and with a wide central consute sulcature, the rest of the metathorax somewhat rugose and hairy; abdomen shining; basal segment almost as wide at the apex as long, not petiolated; apical segment in the ♀ subacuminate above, sulcate at the apex, beneath with the 2nd segment without lateral pilose spots; front femora in the ♂ toothed beneath; all the femora in both sexes fringed on their under side. Length 9—13 mill.

Common.

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♂ something like 4-*maculatus*, but without the spinose cheeks. ♀ very like *chrysostoma* in colour, but the different arrangement of the ocelli distinguish it at once.

19. *cephalotes*, Panz. Faun. Germ. 62, 16; Smith, &c. = *sexcinctus*, Sm. = *interstinctus*, Sm. ?

Larger than the preceding. Head and thorax black; the ♀ with two spots on the collar, and sometimes a spot on the scutellum, yellow; the scape of the antennæ and mandibles in both sexes yellow; the ♂ with the former striped with black above; abdomen with a wide yellow band on each segment, the 1st, 2nd, and 3rd sometimes narrowly interrupted; ♂ with the anterior and intermediate femora and tibiæ yellow in front, and more or less black behind; posterior femora black, with a yellow spot near the apex; all the tarsi yellow; ♀ with the apices of the femora, and the whole of the tibiæ and tarsi, yellow. Head and thorax finely punctured, the latter finely and longitudinally striate, the former in the ♀ sometimes very large; vertex slightly impressed, hairy in front; clypeus and margins of the eyes densely covered with golden or silvery hairs, the former carinated; antennæ in the ♂ with 3rd, 4th, 5th, and 6th joints much widened at the apex, and produced into a blunt tooth; ♀ antennæ simple; thorax hairy; metathorax longitudinally rugose in front, transversely behind; abdomen smooth and shining, basal segment hairy above, apical segment in the ♀ narrowly acuminate and sulcate, densely fringed with bristly testaceous hairs at the sides, that of the ♂ fringed with fine, somewhat curved hairs; 2nd segment of the abdomen beneath with a dull round spot at the side near the base; posterior and intermediate tibiæ denticulate, spinose in the ♀.

Length 12—15 mill.

Common.

Easily distinguished from the preceding by the dentate antennæ of the ♂, and the narrow setose apical segment of the abdomen in the ♀, as well as by the striate thorax in both sexes.

20. *quadrimaculatus*, Fab. Ent. Syst. ii. p. 294, var. 2-*maculatus*, St. F.; *geniculatus*, Shuck. Fig. Smith, Brit. Foss. Hym. pl. iii. fig. 7.

Black; mandibles piceous; thorax often with two spots on the collar, and the post-scutellum, yellow; abdomen

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with occasionally a narrow sinuous band on the basal segment, a transverse spot on each side of the 2nd and 3rd segments, rarely united, a spot on each side of the 4th, varying much in size, and the whole of the 5th yellow; apical segment piceous; every variation of colouring seems to exist between this and an entirely black abdomen; the ♂ has rarely more than a lateral spot on each side of the 2nd and 3rd segments; femora black, those of the ♂ yellow in front, except the posterior pair; tibiæ yellow, black posteriorly, posterior tibiæ yellow at the base; tarsi of anterior and intermediate legs yellow, of posterior legs piceous. Head and thorax shining, punctured; head with a distinct well-marked spine on each cheek beneath; prothorax straight in front, its angles right angles; metathorax crenate at the extreme base, basal area shining, widely sulcate down the middle, and bounded at the sides by a crenate line; metathorax at the sides hairy, and transversely rugose; abdomen finely punctured, somewhat elongate-oval; apical segment in the ♀ flat above, with a few large rugose punctures; posterior tibiæ in the ♀ spinose, in the ♂ with a few prominent spine-like hairs.

Length 8—10 mill.

Hab.—Common.

This very variable species may be known at once by the spine on the cheek beneath.

21. *cribrarius*, Linn. Syst. Nat. ed. x. vol. i. p. 573, Fig. Panz. Faun. Germ. 15, 18, ♂, 15, 19, ♀.

Head and thorax black; scape of the antennæ with a yellow spot near the apex in the ♀; two spots on the collar in both sexes, and the scutellum in the ♀ also, yellow; abdomen black, with a continuous band near the apex of the 1st segment, an interrupted band on the 2nd and 3rd, and a continuous band on the 4th and 5th yellow; in the ♂ there is a yellow band also on the 6th and 7th; the ♀ has the apical segment testaceous above; femora black; tibiæ and tarsi yellow; patellæ of the front tibiæ in the ♂ pale, spotted with small white spots; apex of the basal joint of the front tarsi and the whole of the following joints black. Head punctured, hairy, finely strigose between the eyes; antennæ in the ♂ fusiform; mesothorax longitudinally and rugosely striate, sparsely clothed with brownish hairs; metathorax

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finely rugose, with a crenate central channel, and covered with long hairs, especially in the ♂; abdomen shining, elongate in the ♂, rather wider in the ♀, but much longer than in the species preceding; apical segment in the ♀ triangular and strongly punctured, flat above, and covered with short golden hairs; anterior femora in the ♂ short and swollen, produced behind into a large irregular 5-sided process, and with a sharp short spine quite at the base; anterior tibiæ in the ♂ thickened, with a large membranous patella extending from their outer margin; tarsi much dilated, interior claw very long, bisinuate, and apiculate; front legs in the ♀ simple; intermediate and posterior tibiæ strongly spinose in both sexes.

Length 13—15 mill.

Common in sandy places.

22. *peltarius*, Schreb. Naturforsch. 20 Stück. 98, 3, pl. ii. fig. 6 = *patèllatus*, Panz., Smith, Shuck., &c.

Very like the preceding, but smaller, and at once distinguishable by the simply punctured, not striate, head and thorax; the ♂ with the front femora produced posteriorly into a flat, membranous, yellow, shining process, with a narrow, almost hair-like spine at the base; coxæ spined; tibiæ with the patellæ striped with white posteriorly.

Length 11—13 mill.

Common in sandy places.

23. *scutellatus*, Schev. Naturforsch. 20 Stück. 89, 6. = *pterotus*, Fab. Syst. Piez. p. 311, Dhb., Smith, &c.

Very like *patellatus*, but rather smaller; both sexes have the head and thorax duller, and more closely and rugosely punctured; the prothorax without prominent anterior angles; the ♂ may be known at once by the shape of the anterior femora, the flattened process of which in this species is somewhat triangular, with its external basal angle produced and dentate; whereas in the preceding species it is rounded; the patella of the tibiæ is also differently marked, the stripes from the margin continued and irregularly united on the disk, and the external claw is flattened and somewhat twisted; the ♀ has the basal segment of the abdomen unspotted, the abdomen itself wider in proportion to its length,

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and the tubercles often black and the scape of the antennæ black.

Length 9—10 mill.

Guildford, Dr. Capron; and near Chobham.

24. *vagus*, Linn. Syst. Nat. ed. x. vol. i. p. 571. Fig. Panz. Faun. Germ. 46, 10.

Black; scape of the antennæ, except the base above, a spot on each side of the collar, an interrupted band at the base of the 2nd segment of the abdomen, sometimes, but rarely, a small spot on each side of the 3rd, two wide lateral spots or a continuous band on the 4th and 5th yellow; femora black, yellow at the extreme apex in the ♂, and on the anterior legs in front; tibiæ yellow, narrowly black at the apex, anterior and intermediate pairs black beneath; tarsi with the basal joint pale in the ♂; pale only on the posterior legs of the ♀. Head closely punctured, hairy; 6th joint of the antennæ in the ♂ much constricted at the base; thorax hairy, finely and closely rugose; metathorax with a defined basal area, sulcate down the centre; sides of the mesothorax beneath transversely rugose; abdomen shining, finely punctured, ovate in both sexes, apical segment in the ♀ very narrow and acuminate, shining, rugose, with a slight carina at each side, sides below the carina with a dense fringe of pale bristly hairs; intermediate and posterior tibiæ dentate and spinose in the ♀.

Length 10—13 mill.

Hab.—Common.

The black 3rd segment of the body gives this species an appearance by which it may be easily recognised.

25. *chrysostoma*, St. Farg. Ann. Soc. Fr. vol. iii. p. 704. = *xylurgus*, Shuck.

Head and thorax black; the former with the mandibles and the entire scape of the antennæ in the ♀, and the scape of the antennæ in front in the ♂, yellow; clypeus and margins of the eyes covered with shining golden hairs in the ♀, silvery in the ♂, the latter with a small spot on each side of the collar, and sometimes a spot on the tubercles, yellow; abdomen black, banded or spotted with yellow, having two small spots or a narrow band on the basal segment, and two lateral transverse spots on each of the 2nd, 3rd, and 4th

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segments in the ♀, and also of the 5th in the ♂; those of the 2nd and 4th sometimes uniting so as to form transverse bands; 6th segment in the ♂, and 5th in the ♀ black only at the apex, 6th segment black in the ♀, 7th piceous at the apex in the ♂; femora black, more or less yellow towards the apex above in the ♂; tibiæ yellow, more or less black beneath; tarsi yellow, dusky towards the apex. Head and thorax hairy, finely and rugosely punctured; antennæ in the ♂ with the 3rd and 4th joints somewhat swollen and widely produced at the apex into a sort of rounded tooth, the 5th, 6th, and 7th joints very slightly dentate at the apex; antennæ in the ♀ simple; clypeus carinated; vertex with a narrow impressed line running into the impression of the face above the antennæ; mesothorax posteriorly, and scutellum, slightly longitudinally striate among the punctures; metathorax clathrately rugose in front, transversely rugose towards its apex, with a wide shallow, crenate, central impression; abdomen shining, finely punctured, apical segment in the ♀ very narrow and acuminate, deeply sulcate, its sides densely covered with long testaceous bristly hairs; tibiæ spined in the ♀, and more or less denticulate.

Length 10—12 mill.

Hab.—Generally distributed. F. Smith says he has several times reared the sexes from pieces of willow-stumps.

26. *interruptus*, DeGeer. Mem. ii. 2, 807, pl. xxv. fig. 10—15 = *Lindenius*, Shuck., Smith, &c.

Somewhat like *chrysostoma, cephalotes*, &c., in coloration, but very distinct from all the species of the genus in the sculpture of the thorax. The mesothorax is transversely and rather deeply striate in front and at the sides, longitudinally striate posteriorly; the scutellum is longitudinally striate, the metathorax longitudinally rugose near the base, transversely so near the apex, with a central impression, crenate near the base. The thorax in the ♀ has also two yellow spots on the collar; the tubercles, the scutellum, and a small spot on each side of it also yellow; antennæ simple in both sexes.

Length 12—15 mill.

Hab.—Not common. Darenth, Southgate, Ripley, Bristol, Suffolk, &c.

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27. *albilabris*, Fab. Ent. Syst. ii. p. 302. Fig. Panz. Faun. Germ. 15, 24 (*leucostoma*).

Black, with more or less of a bronzy tint, especially in the ♂. ♂ with the apex of the scape of the antennæ, an interrupted line on the collar, the tubercles, tegulæ, apices of the femora, the tibiæ and tarsi flavous; ♀ with the tegulæ piceous, anterior tibiæ yellow in front, all the tibiæ yellow at the base; extreme apex of abdomen testaceous. Head and thorax punctured, the thorax more finely so than the head; clypeus covered with silvery hairs; thorax as wide as the head; division between the mesothorax and scutellum consute; metathorax longitudinally rugose at the base, not sulcate down the centre, basal area indicated by a narrowly-impressed line surrounding it, sides of the metathorax beyond this line rugose, apex below it somewhat shining and sulcate; abdomen finely punctured, covered with a short decumbent greyish pubescence; apical segment in the ♀ flattened above and carinated at the sides, coarsely punctured and covered above with short golden hairs; posterior tibiæ spinose, especially in the ♀.

Length 7—8 mill.

Hab.—Common on Umbelliferæ, &c., in many places, in July.

28. *Panzeri*, V. de Lind. Nouv. Mem. Acad. Brux. v. p. 69.

Very like the preceding, but black without the bronzy tint. Both sexes may be known from it by the wider head, which is decidedly wider than the thorax. The ♂ may be known besides by the entirely black thorax, by the strong spine on the cheek beneath, and the yellow mandibles; the ♀ by the yellow mandibles, and clear yellow scape, tibiæ, and tarsi, a yellow spot on each side of the collar, tubercles, and sometimes a spot on the scutellum. In this species the yellow seems to predominate in the ♀, in the preceding in the ♂.

Length 7—8 mill.

Hab.—Rare. Darenth, Birch Wood, Weybridge, Isle of Wight, &c.

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29. *clypeatus*, Linn. Syst. Nat. ed. xii. i. p. 945. Fig. Panz. Faun. Germ. 46, 5 (*vexillatus*) = *vexillatus*, V. de Lind., &c.

Black; the scape of the antennæ in front, and two large lateral spots on each of the 1st four abdominal segments, a continuous band on the others, the anterior and intermediate legs in the ♂, except the anterior femora beneath, the posterior tibiæ and tarsi, except a triangular spot on the former, yellow; the ♀ has the femora of all the legs black, except at the extreme apex; the tibiæ and tarsi yellow; beneath in ♂ with a quadrate yellow spot on the 2nd segment, and a narrow band on the 3rd of the same colour. Head deeply punctured, triangular, and constricted posteriorly from the vertex into a narrow neck in the ♂, the face very narrow between the eyes, large and quadrate in the ♀, sides of the head very hairy in the ♂; thorax very largely and deeply punctured, much constricted in front in the ♂ and elongate; prothorax in the ♀ with its anterior angles spinose; metathorax rugose in both sexes, with a wide central crenate line; abdomen largely and coarsely punctured; apical segment in the ♀ very narrow and acuminate, and deeply sulcate; front tarsi in the ♂ much dilated, the 1st joint with a large subquadrate patella.

Length 9—10 mill.

Hab.—Weybridge, F. Smith. I have a ♂ and ♀ from Shuckard's collection without note of locality.

Oxybelus, *Latr.* (Pl. VIII. fig. 47).

Prec. Caract. Gen. Ins. p. 129.

Differs from the other genera of this family in having the submarginal cell confluent with the discoidal cell, *i. e.*, only separated from it by a very indistinct nervure, the scutellum bearing a wing-like appendage on each side, and the metathorax a curved spine near the base.

(2) 1. Abdomen covered with long silvery pubescence .. *mucronatus*.
(1) 2. Abdomen not covered with silvery pubescence.
(4) 3. Mandibles yellow .. .. *mandibularis*.
(3) 4. Mandibles black.
(6) 5. Segments of the body less finely punctured; legs entirely black in ♀ .. .. *nigripes*.
(5) 6. Segments of the body more finely punctured; legs not entirely black in ♀ .. .. *uniglumis*.

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I have omitted the following species, described by Shuckard and Smith as British, as their claims to a place in our fauna seem to me to rest on very doubtful authority:— *bellicosus*, Oliv., 14-*notatus*, Oliv., *nigricornis*, Shuck., *bipunctatus*, Oliv., and *nigroæneus*, Shuck.

1. *uniglumis*, Linn. Syst. Nat. ed. x. vol. i. p. 573. Fig. Panz. Faun. Germ. 64, 14.

Black; antennæ towards the apex, beneath fulvous; thorax with the tubercles in the ♀ pale, and the tegulæ in both sexes; abdomen with a whitish spot on each side of the 1st and 2nd segments of the ♂ and of each of the segments of the ♀ except the 6th; legs with the tibiæ and tarsi fulvous, and the extreme apex of the femora in the ♀. Head and thorax rugosely punctured, covered with short hairs, those on the face, in front of the antennæ, bright silvery; wings subhyaline, nervures pale; scutellum with a central carina; wing-like appendages of the post-scutellum pale, subtriangular, acute; spine of the metathorax short and rounded at the apex; metathorax traversed by fine elevated lines, basal area defined by an elevated line intersecting these others, sides with an elevated ridge running nearly parallel to the sides of the basal area; abdomen dull in the ♂, shining in the ♀, its puncturation very fine and close, especially on the 2nd and following segments, its surface covered with short grey hairs, longer in the ♂ than the ♀; tibiæ and tarsi with pale spines.

Length 6—9 mill.

Hab.—Common in many sandy places, and generally distributed.

2. *mandibularis*, Dbm. Hym. Eur. i. p. 514.

♂ closely allied to the above, but having the mandibles flavous at the base and rufescent at the apex, the spots of the abdomen of a more distinct yellow, and the puncturing of the segments, especially of the 2nd and following, much stronger, and more scattered; thorax with the tubercles and a spot on each side of the collar flavous; the femora are black, with their apices pale, and the front tarsi are broadly flavous beneath; the tibiæ flavous, more or less reddish at their extremities, the 1st and 2nd pairs with a streak behind, and the 3rd with a broad band near the apex, black; tarsi rufescent.

Length 6 mill.

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Hab.—Littlehampton, one ♂; one ♂, C. W. Dale; and one ♂, loc. ?, J. B. Bridgman. I only know the ♂ of this species. According to Thomson the ♀ also should have pale mandibles, and the 2nd ventral segment of the abdomen very closely and finely punctured in the middle.

3. *nigripes*, Oliv. Encycl. Meth. viii. p. 596.

♀ differs from either of the preceding in having the metathoracic spine narrow and truncate at the apex, the abdomen spotted only on the 1st and 2nd segments, and the legs black, with the exception of the front tibiæ, which are fulvous, as well as all the tarsi, the other tibiæ very narrowly pale at the base.

Length 8 mill.

One specimen, ♀, taken by Mr. S. Stevens in Devonshire.

4. *mucronatus*, Fab. Ent. Syst. ii. p. 300. Fig. Smith Brit. Foss. Hym. pl. iii. fig. 6 = *argentatus*, Cur. = *ferox*, Shuck.

Recognisable at once by the fine, narrow, pointed metathoracic spine and the silvery pubescence with which the entire insect is covered; the ♂ with a lateral spot on each of the 1st five segments of the abdomen; ♀ with a transverse spot on each side of the 1st three segments, and a band on the 4th and 5th.

Length 8—9 mill.

Hab.—Bristol; Liverpool; Deal; &c. Not common.

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ERRATA.

P. 257, line 3 and line 7 from top, *for* mesopleuræ *read* mesopleura.
P. 261, line 4 and line 5 from bottom, *for* mesopleuræ *read* mesopleura.

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Explanation of Plate VIII., Fig. 41.

Giving nomenclature of nervures and cells.

1. Costal cell.
2. Externo-medial cell.
3. Interno-medial cell.
4. Anal cell.
5. Marginal cell.
6. 1st submarginal cell.
7. 2nd ,,
8. 3rd ,,
9. 4th ,,
10. 1st discoidal cell.
11. 2nd ,,
12. 3rd ,,
13. 1st apical cell.
14. 2nd ,,

a. Costal nervure.
b. Post-costal nervure.
c. Externo-medial nervure.
d. Anal nervure.
e. Posterior margin.
f. Stigma.
g. Radial nervure.
h. Apical margin.
i. Externo-medial nervure (extension of *c*.)
j. Transverse medial nervure.
k. Discoidal nervure.
l. External nerve of 1st submarginal cell.
m. External nerve of 2nd submarginal cell.
n. External nerve of 3rd submarginal cell.
o. Cubital nervure.
p. 1st recurrent nervure.
q. 2nd ,,
r. Subdiscoidal cell.

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XVII. *On a collection of* Hemiptera *from Japan.*

By John Scott.

[Read December 1st, 1880.]

In my former paper published in the Ann. & Mag. of Nat. Hist., vol. xiv. (1874), I called attention, in the list given at the commencement, to certain species about whose names I was then uncertain. Since that time I have determined them, and below give the results. In addition to these I have also added a few more genera and species received by me from Mr. George Lewis, after the publication of the paper above referred to, and, having fully investigated them, I am able to add one new genus and a few new species.

HEMIPTERA—HETEROPTERA.*

Fam. Podopidæ.

Scotinophora scutellata, n. sp.

,, *tarsalis*, Scott.

This insect has been renamed *S. Scottii* by Dr. Horváth in a Hungarian publication, as the name *tarsalis* had been used by S. von Vollenhoven in his Faun. Ind. Néerl. i. p. 42, 3, pl. 3, f. 8 (1863), of which I was not aware until my attention was called to the fact.

Fam. Asopidæ.

Asopus japonensis, n. sp.

Fam. Cydnidæ.

Æthus palliditarsus, n. sp.

Fam. Halydidæ.

Stollia guttigera, Thunb.

Fam. Pentatomidæ.

Alcimus japonensis, n. sp.

---

* The *Homopterous* portion will form a separate paper.

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Fam. Phyllocephalidæ.

Tetroda histeroides, Fab.

Fam. Megymenidæ.

Megymenus spinosus, Burm.

This is the insect mentioned in my former paper about which I was in doubt.

Fam. Stenocephalidæ.

Paraplesius unicolor, Scott.

This insect must be removed from the *Coreidæ*, where it stands in my former paper, and placed in this family.

Fam. Lygæidæ.

Pamera picta, n. sp.

Fam. Pyrrhocoridæ.

Physopelta cincticollis, Stal.

Pyrrhocoris coriaceus, Scott.

This insect is also described by Stal in his Enum. Hemip., part 5, p. 168 (1874) under the name of *P. tibialis*, and, being older than mine, must be substituted for it.

Fam. Capsidæ.

Calocoris tricolor, n. sp.

This is the genus *Deræocoris* of my former paper.

Fam. Tingididæ.

Lepodictya, Stal?

,, *Lewisi*, n. sp.

Fam. Harpunctoridæ.

Irantha armipes, Stal.

Fam. Reduviidæ.

Acanthaspis cincticrus, Stal.

Fam. Piratidæ.

Pirates cinctiventris, Horváth.

Sirthenea flavipes, Stal.

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Fam. Nabidæ.

Dacnister, nov. gen.

,, *flavescens*, n. sp.

Fam. Gerridæ.

Gerris paludum, Fab.

Family Podopidæ.

Genus Scotinophora, *Stal.*

Scotinophora scutellata.

Luteous, dull, somewhat thickly and irregularly brown punctured. *Pronotum*, anterior angles produced into an almost equilateral angular tooth, lateral margins sloping almost evenly towards the posterior angles and terminating in a stout tooth, disc with a small bone-white elevation at the inner angle of the callosities. *Scutellum* with a pitchy-black funnel-shaped patch extending from the base to about the centre, lateral margins slightly convex, basal angles with a small bone-white spot. *Head* black, thickly punctured. *Face*, central lobe viewed from the side slightly concave, shorter than the side lobes, which are somewhat reflexed, apex of the latter scarcely acute, with an almost square notch between them. *Antennæ* piceous. *Thorax.—Pronotum*, anterior half dull black punctured, with a distinct callosity on each side of the centre, at the inner angles of the posterior margin of which is a small bone-white elevation; posterior half luteous, somewhat thickly and irregularly brown punctured. *Scutellum* luteous, slightly shining, irregularly brown punctured, with a large deeply-punctured funnel-shaped pitchy-black patch extending across the anterior margin and having its apex near the centre, adjoining the basal angles a small bone-white callus; apical and side margins narrowly purplish brown. *Elytra* somewhat purplish brown, irregularly punctured. *Legs* black. *Tibiæ* clothed with short hairs having a white appearance in certain lights. *Tarsi* dull yellow, terminal joint above brownish. *Claws* dark brown.

Length 2½ lines barely.

Easily separated from all the other species of the genus by the two bone-white elevations on the pronotum, and the pitchy-black funnel-shaped patch on the scutellum, bounded on each side at the base by a bone-white

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callus. Probably, when in fine condition, the upper surface will be found to have a polinose appearance. I possess a single example only.

Family Asopidæ.

Genus Asopus, *Burm.*

Asopus japonensis.

Scarlet. *Head* finely wrinkled transversely. *Pronotum* posteriorly finely punctured, the punctures running transversely in short irregular rows, giving to the disc a slight rugose appearance; anterior margin with a narrow black collar terminating on each side in a line with the inner margin of the eyes; disc with a somewhat hatchet-shaped black patch. *Scutellum* black, except the apex and side margins, thickly but finely rugose-punctate. *Elytra* thickly and somewhat deeply punctured; clavus almost entirely, and a large nearly round spot on the corium, black. *Membrane* piceous, with a yellowish margin. *Legs* black, clothed with dark hairs which in certain lights appear of a red-brown colour. *Tarsi* beneath thickly clothed with yellowish hairs. *Abdomen* beneath with a large somewhat semioval black spot on the sides of each segment. *Head* scarlet, finely wrinkled transversely, side margins very much reflexed, rounded in front, and gradually widening until reaching the anterior inner margin of the eyes, where they contract; posterior margin narrowly blackish, with an indistinct longitudinal reddish line on each side near the ocelli. *Antennæ* black, thickly clothed with very short hairs which in certain lights appear of a red-brown colour; 1st joint underneath, at the base, scarlet; apex narrowly white, apices of the 2—4, at the insertion of the joints, white. *Eyes* reddish brown. *Thorax.—Pronotum* scarlet, finely punctured posteriorly, the punctures running transversely in short irregular rows, giving to the disc a slight rugose appearance; lateral margins very much reflexed, contracted near the middle; anterior margin with a narrow black collar terminating on each side in a line with the inner margin of the eyes; disc with a somewhat hatchet-shaped black patch, having a rather indistinct and irregular channel across the middle. *Scutellum* black, thickly but somewhat finely rugose-punctate, with a central keel springing from near the middle and terminating a little before the apex; apex, a narrow line down the middle of

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the central keel, and the side margins, scarlet. *Elytra* scarlet, thickly and somewhat deeply punctured; lateral margins very much reflexed, and terminating a little way before the apex. *Clavus* black; base, apex, inner margin and suture scarlet. *Corium*, disc with a large almost round black spot having its lower margin almost in a line with the apex of the scutellum. *Membrane* piceous, with a yellowish margin. *Legs* black, clothed with dark hairs which in certain lights appear of a red-brown colour. *Tarsi* beneath thickly clothed with short yellowish hairs. *Abdomen* beneath, scarlet on the sides, slightly shading into yellowish towards the middle, on the side of each segment next the anterior margin a large somewhat semioval black spot; posterior margin of each segment between the extremities of the spots very narrowly black.

Length 8½ lines.

A fine species, which at first sight might be taken for a huge *Lygæus* of the *familiaris* type, and thus easily recognised. There were two specimens given to me by Mr. George Lewis, after the publication of my previous paper.

Family Cydnidæ.

Genus Æthus, *Dall.*

Æthus palliditarsus.

Black, shining. *Head* on each side somewhat coarsely punctured. *Antennæ* brownish. *Pronotum* with a row of minute punctures, running parallel with the anterior margin, sides, and a few rows running parallel with the posterior margin; disc and posterior margin shining. *Scutellum* somewhat coarsely punctured, except a lunate patch at the base. *Elytra* somewhat thickly punctured, the punctures becoming finer as they approach the apex. *Membrane* yellow. *Legs* pitchy-brown. *Tarsi* pale brownish yellow. *Head* black, shining, somewhat coarsely punctured on each side of the central lobe. *Ocelli* pale. *Antennæ* brownish, apex of the joints brownish yellow. *Thorax.—Pronotum* black, shining, with a row of minute punctures a little within, and running parallel with, the anterior margin, and terminating nearly in a line with the inner margin of the eyes, where the punctures are slightly coarser and disposed irregularly: lateral margins with a few pitchy-coloured

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hairs; disc and posterior margin shining, the latter somewhat piceous, sides and a few irregular rows of punctures running parallel with the posterior margin. *Scutellum* somewhat coarsely but not densely punctured, except a lunate patch at the base. *Elytra* somewhat thickly punctured, the punctures becoming finer as they approach the apex of the corium. *Membrane* yellow. *Legs* pitchy-brown. *Tarsi* pale brownish yellow. *Abdomen* beneath dull black, thickly and finely punctured, at the apex with a few pitchy-coloured hairs.

Length 1½ line.

Many of the species of this genus are so much alike that it is difficult to distinguish them by the most minute description; and I confess that, although I have described the insect under the above name, I am in doubt because Dr. Snellen van Vollenhoven, in his Faun. Ind. Néerl., iii., p. 17; 2 (1868), described a species under the name of *Æ. pallidicornis*, which in many points agrees with the above. I wrote to him for the loan of an example, for comparison, but unfortunalely he died, and so I never received it. I have only a single example, but without note of locality.

Family Pentatomidæ.

Genus Alcimus, *Dall.*

Alcimus japonensis.

Flavous, thickly black-punctured, the punctures running in short, irregular, confused, frequently-curved striæ. *Head* almost perpendicular; base of the central lobe, with a round unpunctured space, and a narrow, longitudinal stripe on either side, also unpunctured; next the inner margin of each eye a somewhat reniform flavous patch. *Antennæ* pitchy-brown. *Pronotum*, posterior angles reflexed and produced into a spine having an acute tooth a little way before the apex of the anterior margin. *Scutellum* with a flavous spot within each basal angle. *Corium*, nerves pale flavous. *Membrane* brown. *Legs* flavous. *Thighs* with pitchy-brown punctures, except the base and apex. *Tibiæ* brownish yellow. *Tarsi* piceous, 1st joint underneath thickly clothed with short pale yellowish hairs. *Abdomen* underneath flavous, sides faintly punctured, the punctures fading before reaching the middle, down which is a broadish pitchy-black streak; genital segment pitchy-black. *Head* flavous, almost perpendicular, thickly black-punctured.

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Crown with a round unpunctured space at the base of the central lobe; next the inner margin of each eye a somewhat reniform flavous patch. *Face* with a narrow unpunctured stripe on each side of the central lobe. *Antennæ* pitchy-brown. *Thorax.—Pronotum* flavous, thickly black-punctured, the punctures running in short, irregular, confused, frequently-curved striæ; lateral margins at the base with a pale flavous elongate, elevated patch; posterior angles reflexed and produced into a spine having an acute tooth a little way before the apex of the anterior margin; surface between the tooth and the apex black, faintly channeled. *Scutellum* flavous, thickly black-punctured, the punctures running in short, irregular, confused, frequently-curved striæ; within the basal angles a flavous spot. *Elytra.—Corium*, nerves pale flavous, unpunctured; disc black-punctured, the striæ running longitudinally. *Membrane* brown. *Legs* flavous. *Thighs* slightly clothed with yellowish hairs and with pitchy-brown punctures; base, apex, and a narrow longitudinal streak on the under side, unpunctured. *Tibiæ* flavous, with a brown tinge, with a few yellowish hairs. *Tarsi* piceous; 1st joint underneath thickly clothed with short pale yellow hairs. *Abdomen* underneath flavous, sides faintly punctured, the punctures fading before reaching the middle, down which is a broadish pitchy-black streak; on the sides of each segment is a more or less distinct pitchy-black L-shaped character; genital segment pitchy-black.

Length 3½ lines. Expansion across the spines 3½ lines.

Dr. Stal, in his Enumeratio Hemipterorum, part 5, p. 88 (1876), describes a species from Dekan under the name of *A. coronatus*, to which the insect just described bears a great resemblance; but the differences in the coloration of the antennæ, the characters on the pronotum, the differences in the expansion across the posterior angles of the latter, as compared with the length, will sufficiently enable anyone to separate them. I have only a single example, but have no note of locality.

Family Lygæidæ.

Genus Pamera, *Say*.

Pamera picta.

Ochreous, slightly shining, thickly but finely brown-punctured. *Head* pitchy-black. *Antennæ* yellowish;

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1st joint projecting half its length in front of the head. *Pronotum* pitchy-black, deeply constricted beyond the middle, anterior portion somewhat annular, unpunctured; posterior portion punctured; hinder angles slightly raised. *Scutellum* pitchy-black, punctured on each side of the central keel. *Elytra* ochreous, finely brown-punctured. *Corium* with a whitish triangular patch near the inner margin in a line with the apex of the clavus. *Membrane* pale, with short brown streaks between the nerves. *Thighs*, 1st pair incrassated, toothed, black; apex yellow; 2nd and 3rd yellow, black at the apex. *Abdomen* underneath pitchy-black. *Head* pitchy-black, not shining, about as long as wide across the eyes. *Crown* convex. *Antennæ* yellowish, 1st joint projecting one-half its length in front of the head; 2nd and 3rd almost equal in length; 4th brown, nearly as long as the 1st and 2nd together. *Thorax.—Pronotum* pitchy-black, slightly shining, with a narrow collar in front, deeply constricted beyond the middle; anterior portion somewhat annular, unpunctured; posterior portion finely punctured; hinder angles slightly raised. *Scutellum* pitchy-black, punctured on each side of the central keel. *Elytra* ochreous, slightly shining, thickly but finely brown-punctured; inner margin from below the apex of the scutellum very narrowly whitish yellow. *Corium* ochreous, slightly shining, thickly but finely brown-punctured, with a whitish triangular patch near the inner margin, in a line with the apex of the clavus. *Membrane* pale, with short brown streaks between the nerves. *Legs* pale yellow. *Thighs*, 1st pair incrassated, toothed, black, apex pale yellow; 2nd pale yellow, narrowly black before the apex; 3rd pale yellow, broadly black at the apex. *Tibiæ* pale yellow, 2nd and 3rd pairs very narrowly brown at the base. *Tarsi* pale yellow; 3rd joint and *claws* brown. *Abdomen* underneath pitchy-black.

Length 2 lines.

I possess two specimens,—one labelled Japan, the other China,—which so very much resemble each other, that I am inclined to think they may be the same, although the Chinese one has a slightly narrower appearance, and the two hinder pairs of legs pale.

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Family Capsidæ.

Genus Calocoris, Fieb.

Calocoris tricolor.

Brownish yellow, sparingly clothed with fine, silky, appressed yellow hairs. *Head* reddish chestnut. *Crown* with a depression between the eyes divided by a short, central, longitudinal channel terminating before reaching the base. *Pronotum* dark chestnut-brown, finely wrinkled transversely trom the posterior margin to as far as the callosities, behind which is a depression. *Scutellum* pitchy-brown. *Elytra* brownish yellow. *Cuneus* red. *Legs* reddish yellow. *Tibiæ*, 3rd pair red. *Head* reddish chestnut, darkest on the crown. *Crown* with a depression between the eyes divided by a short, central, longitudinal channel terminating before reaching the base. *Antennæ*, 1st joint reddish yellow; 2nd pale yellowish, base narrowly reddish, apical half reddish, gradually becoming darker to the apex; 3rd reddish brown, broadly yellowish, or yellowish white at the base; 4th reddish brown, base and apex yellowish or yellowish white. *Eyes* brown-pink. *Thorax.—Pronotum* dark chestnut-brown, finely wrinkled transversely from the posterior margin to as far as the callosities, behind which is a depression. *Scutellum* pitchy-brown. *Elytra* brownish yellow, sparingly clothed with fine, silky, appressed yellow hairs, each hair set upon a very minute granule. *Corium*, nerves inclined to a reddish brown. *Cuneus* red, shading into brownish as it approaches the base; sparingly clothed with fine, silky, appressed yellow hairs, each hair set upon a very minute granule. *Membrane* with a brownish yellow hue: *cell nerves* brown or brown-red; below the apex of the cuneus is a pale narrow triangular patch, and underneath it a dark one. *Legs* reddish yellow. *Thighs* of all the pairs reddish yellow. *Tibiæ*, 1st pair pale yellow, base narrowly reddish; 2nd pale yellow, basal one-third reddish yellow, spinose hairs reddish; 3rd red, spinose hairs darker. *Tarsi* of all the pairs yellow, apex of the 3rd joint and *claws* reddish. *Abdomen* wanting.

Length 3½ lines.

I do not possess, nor have I seen, any species with which I could make a comparison between it and the insect now described; but the characters on the antennæ, the red cuneus, and tibiæ of the 3rd pair of legs, should render it easy to be recognised. I referred to this insect

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under the generic name of *Deræocoris* in my former paper. No locality is given with the insect in my possession.

Family Tingididæ.

Genus Leptodictya, *Stal?*

Leptodictya Lewisi.

Pale ashy-grey. *Antennæ* pale yellowish grey, apex of the terminal joint blackish. *Eyes* bright red. *Pronotum* side margins overlapped and produced into large bladder-like processes covered with meshes; hood somewhat large, covered with meshes. *Elytra* gradually widening to the middle of the marginal nerve, from thence to before the apex concave, apex rounded; marginal nerve reflexed with three rows of meshes, the two inner rows small and somewhat uniform in size, the outer one large and irregular, except at the fuscous-black middle, where there are three smaller ones somewhat square in shape and about equal to each other in size; alternate meshes V- or U-shaped; marginal nerve with three fuscous-black spots before and four beyond the middle. *Membrane* meshes becoming larger as they approach the apex. *Head* pale yellowish white, spines pale yellowish white. *Antennæ* pale yellowish grey, apex of the terminal joint black. *Eyes* bright red. *Thorax.—Pronotum* ashy-grey, side margins overlapped and produced into large bladder-like smoke-coloured processes covered with meshes, the latter largest on the summit, and of an irregular pentagonal form; hood somewhat large, covered with meshes. *Elytra* ashy-grey, gradually widening from the base to the middle of the marginal nerve, from thence narrowing and concave to before the apex, which is rounded; marginal field reflexed, with three rows of meshes, the two inner rows small and somewhat uniform in size, the outer one large and irregular, except at the middle, where there are three smaller meshes somewhat square in shape and about equal to each other in size; middle with a fuscous-black patch, alternate meshes V- or U-shaped; marginal nerve with three black spots before, and four beyond, the middle; apex rounded, bordered with black; cells acute at the base and apex, meshes somewhat regular, increasing in number transversely until they reach the middle, where there are four in a row. *Membrane* meshes gradually enlarging towards the apex; inner marginal row largest, square-shaped,

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and somewhat uniform in size. *Legs* ashy-grey. *Tarsi*, apex of the terminal joint brownish. *Abdomen* underneath yellow.

Length 1½ line.

In the form and development of the overlapped sides of the pronotum this insect resembles the *Monanthia monstrosa* of my former paper, and belongs to the same group. In his Rio. Hem. (1860), Dr. Stal described five species with nearly identical characters to those of *M. monstrosa* and the insect now described, which he referred to the above genus; but subsequently, in his 'Enumeratio Hemipterorum,' iii., 127 (1873), he transferred them to that of *Leptodictya*, a name which he created for their reception. As I do not possess an actual type of this genus, and also because the species are all from Rio, I am not perfectly certain that my insects belong here; and so I have given his name with a doubt. I only posess a single example.

Family Nabidæ.

Genus Dacnister.*

Head viewed from above, exclusive of the eyes, elongate, somewhat hexagonal, the part in front of the eyes longer than from the anterior margin of the latter to the base. *Eyes* moderate. *Antennæ*, 1st joint shortest, reaching to about one-half its length before the anterior margin of the head; 2nd clavate, about one-half longer than the 1st; 3rd longest; 4th equal to the 2nd. *Rostrum* long; 1st joint stout, about as broad as long; 2nd elongate, at least 2¼ times as long as the 1st; 3rd equal to the 2nd. *Thorax.—Pronotum* somewhat long, flattish convex longitudinally, as long as or slightly longer than the breadth measured on the posterior margin; lateral margins almost straight, gradually widening to the posterior angles; anterior margin straight; posterior margin very slightly concave. *Elytra.—Membrane* (apparently) without cell-hooks. *Legs.—Thighs*, 1st pair thick, upper margin convex, lower margin with a stout tooth in the middle; 2nd and 3rd pairs simple. *Tibiæ*, 1st pair considerably dilated before the apex, then tapering towards the latter; extremities of the dilation somewhat flat on the sides, and produced into a short tooth; inner margin concave, with two rows of minute serrations;

* Δακμιστήρ, a stinger, a biter.

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2nd and 3rd pairs simple. *Tarsi*, 1st and 2nd pairs equal in length, 3rd longest.

Somewhat resembling the genus *Metastemma*, Serv., in shape and some of its characters, and in others to that of *Allœorhyncus*, Fieb., to which it is most nearly allied. The eyes, however, are not so prominent as in the last named, and the 2nd pair of thighs are simple on the under side. Like *Allœorhyncus* it is very diminutive in stature.

Dacnister flavescens.

Buff, with a dull velvety appearance. *Head* black, anterior margin brownish yellow. *Antennæ*, 1st joint projecting about half its length before the anterior margin of the head; 2nd clavate, black, about one half longer than the 1st; 3rd longest; 4th equal to the 2nd. *Rostrum*, 1st joint stout, about as long as broad; 2nd and 3rd elongate, about equal in length. *Pronotum* buff, anterior margin straight, posterior slightly concave, lateral margins widening gradually to the posterior angles. *Scutellum* black. *Corium*, anterior margin with a border of short, fine, pale hairs; disc with a triangular diaphanous white patch. *Membrane* fuscous-brown, narrowly margined with yellowish white. *Thighs*, 1st pair incrassated, upper margin convex, with a row of longish fine, pale hairs; lower produced into a stout acute tooth in the middle; 2nd and 3rd simple. *Tibiæ*, 1st pair considerably dilated before the apex, upper margin convex, lower concave, with a double row of minute serrations, extremities of the dilation flattish on the sides, produced into a very short fine tooth; 2nd and 3rd pairs simple. *Head* black, somewhat shining, slightly convex, anterior margin brownish yellow. *Antennæ*, 1st joint projecting about one-half its length before the anterior margin of the head; 2nd clavate, black, about one half longer than the 1st, base narrowly yellowish; 3rd longest, darkish brown; 4th yellowish, equal to the 2nd. *Rostrum*, 1st joint stout, yellowish, about as long as broad, lateral margins piceous, somewhat convex; 2nd and 3rd elongate, yellow, about equal in length. *Thorax.—Pronotum* buff, with a dull velvety appearance, anterior margin straight, posterior slightly concave, lateral margins nearly straight, widening gradually to the posterior angles, which are narrowly rounded; disc posteriorly slightly elevated, with an

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almost round black spot on each side, divided by a short longitudinal channel. *Scutellum* black, side margins slightly convex. *Elytra* buff, with a dull velvety appearance. *Corium*, interior margin with a border of short, fine, pale hairs; disc with a triangular diaphanous white patch, nerves inclined to brown. *Membrane* fuscous, brown, narrowly margined with yellowish white. *Legs*.—*Thighs*, 1st pair yellow, incrassated, upper margin convex, with a row of longish, fine, pale hairs, lower margin produced into a stout acute tooth in the middle; 2nd and 3rd pairs yellow, simple. *Tibiæ*, 1st pair yellow, considerably dilated before the apex, upper margin convex, lower concave, with a double row of minute black serrations, extremities of the dilation flattish on the sides, produced into a very short fine tooth; 2nd and 3rd pairs yellow, simple. *Tarsi* of all the pairs yellow. *Abdomen* above yellow inclined to ferruginous-brown, beneath yellow. *Connexivum* buff.

Length 1½ line.

I have only a single example, which I received from Mr. George Lewis after the publication of my last paper. Taken at Nagasaki.

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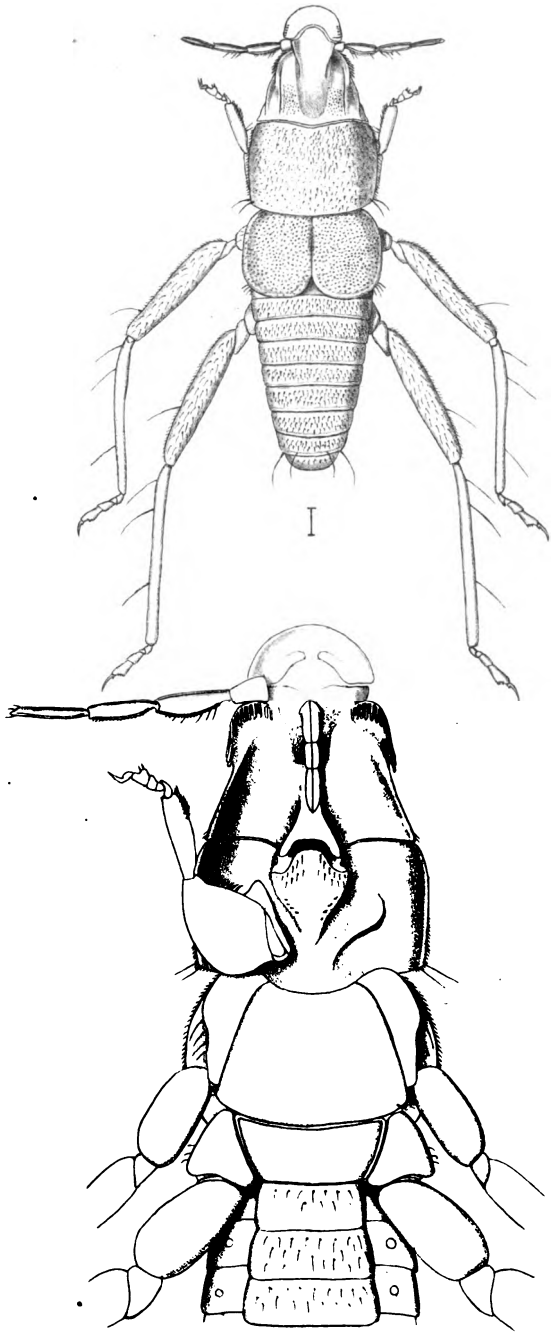

Edwin Wilson del. et lith.

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Polyctenes longiceps.

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XVIII. *Description of a New Species of the anomalous genus* Polyctenes.

By Chas. O. Waterhouse.

[Read December 1st, 1880.]

(Plate IX.)

I have very much pleasure in bringing before the Society's notice a new species of the curious genus *Polyctenes*.

The species of this genus may be divided into two sections as follows :—

I. Posterior legs very long, as long as the whole insect, the claws to their tarsi nearly equal, with a small tooth at the base. American.
Type. *P. fumarius*.

II. Posterior legs comparatively short and thick, about half the length of the entire insect, having their claws unequal, one being nearly simple, the other large, bent, and as if divided into two by a deep incision. Old World.
Type. *P. molossus*.

To this second section belong my species, *P. lyræ* and *P. spasmæ*. (T. Ent. Soc. 1879, pp. 11 and 12).

The species which I am now about to describe belongs to the first section, and is from Guatemala. I propose to call it—

Polyctenes longiceps.

Very close to *P. fumarius*, Giglioli and Westw. (*see* Westwood, 'Thesaurus,' pl. 38), but of a more elongate and narrow form, and rather more pitchy yellow colour. The character by which it may be most easily distinguished is the form of the head, which is distinctly longer than its greatest width, whereas in *P. fumarius* the head is broader than long. The ridges on the head are similar to those in *P. fumarius*, but the punctuation is stronger. The thorax and elytra agree with those of *fumarius* in general form, but are less short, and the

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punctuation is more pronounced. The abdomen is rather closely and very strongly punctured.

Length 2 lines.

Hab.—Cajabon, Guatemala (F. C. Sarg).

Two specimens found by my colleague, Mr. Oldfield Thomas, on a bat, *Molossus abrasus*, Temminck.

The discovery of this species throws some light on the affinity of these insects, as I notice that in these fresh specimens the parts which in my former paper I called the dorsal plates of the mesothorax, as they did not seem to be separated from it, are distinctly separated, and appear quite like elytra. With the point of a fine needle I was quite able to lift them up at the apex, but they are soldered together at the suture. Under these circumstances my former opinion that these insects should be placed near the *Hippoboscidæ* is, I think, quite proved to be incorrect; in which case Professor Westwood's view of their affinity with the *Hemiptera* seems to be the only alternative.

The tarsi in the species now described are four-jointed. *P. fumarius* has four joints, as has also one sex of *P. molossus*; the other sex of *P. molossus* is represented as having only three joints. I believe *P. lyræ* and *P. spasmæ* have four joints, but the apparent division between the 3rd and 4th joints is so obscure as to leave room for doubt on this point.

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